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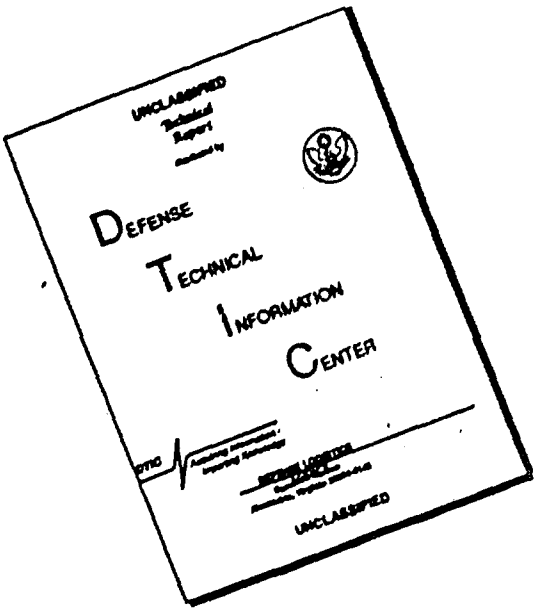

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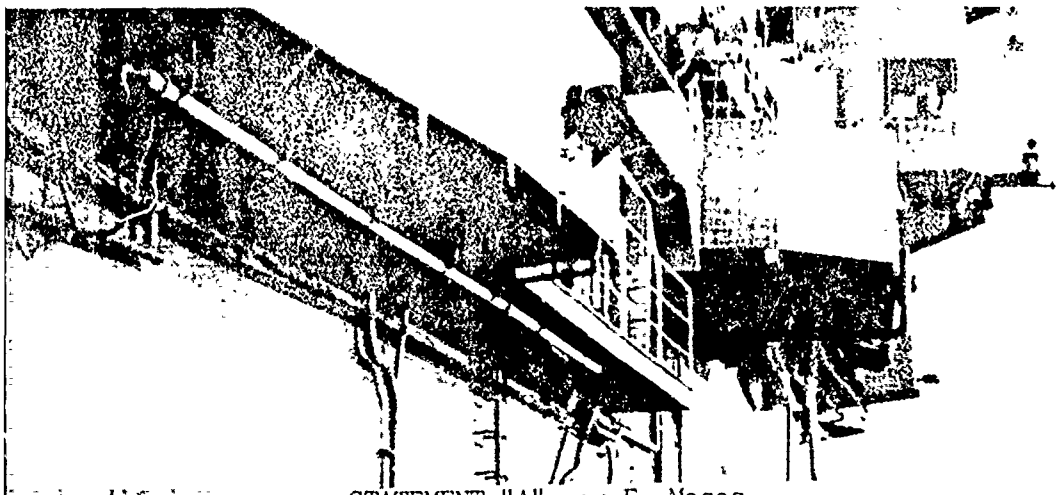
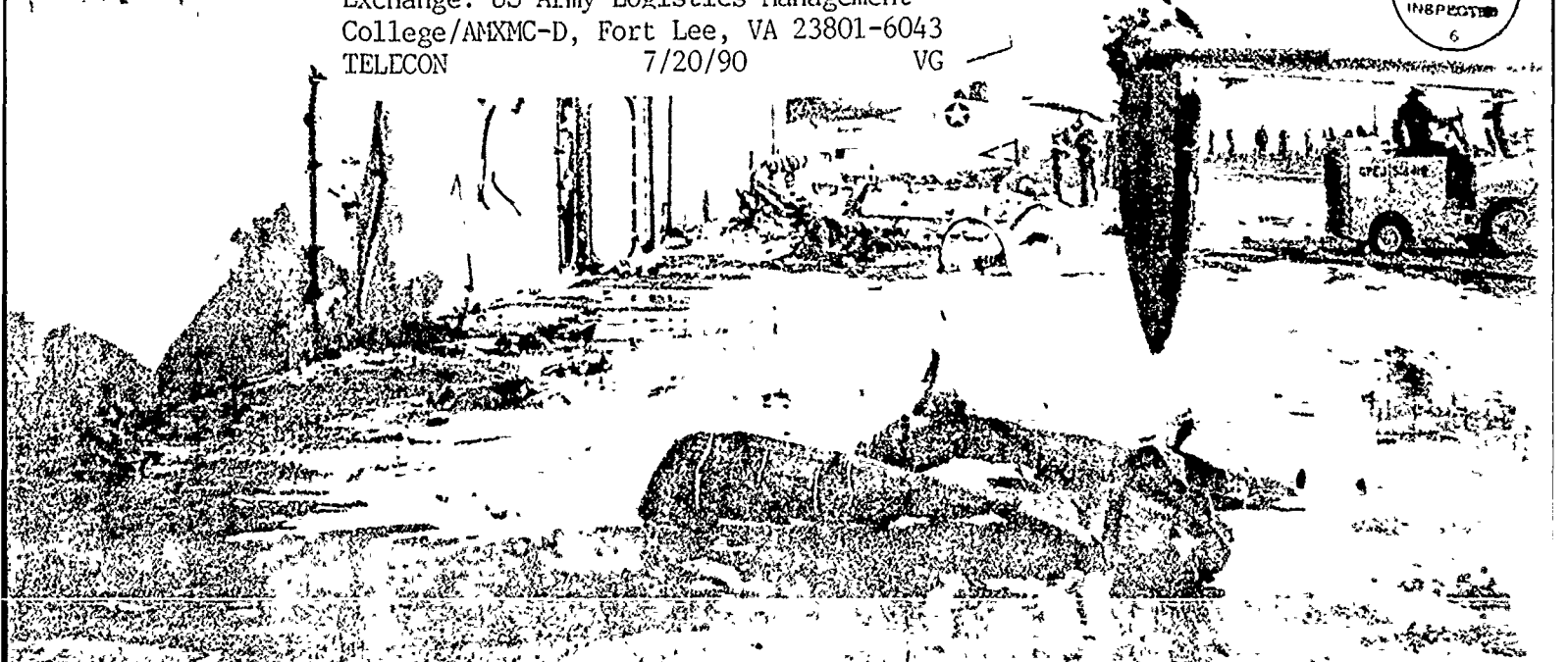
January/February 1990

Mech

The Naval Aviation Safety Maintenance Review





The Technical Manuals Improvement Program

By LCdr. Richard Veltman

TECH MANUALS have always been a weak link in equipment support. Some manuals have been inaccurate or incomplete. Frequently, the books have been too large and cumbersome, or so poorly organized that the information was difficult to find. Some were so technical that users found them incomprehensible. Changes or revisions to tech manuals were often distributed through unofficial channels, leaving some users without all the changes and almost all of the users unsure of how many changes were currently in effect.

The outlook for tech manuals changed in 1984 when the Inspector General reported that quality in the military technical manuals was woefully lacking. As a result of that report, beginning in FY 87, the SYSCOMs made money available to improve tech manuals. At the same time, each SYSCOM formed a policy and technical council to direct a program for managing their tech manuals.

Now, joint SYSCOM committees meet to improve all aspects of tech manuals, including development, stocking, issue and distribution. They are looking at issuing an adequacy guide, digitalizing the tech manuals, improving methods for updating manuals, and improving ADP compatibility between the SYSCOMs and the Naval Publications and Forms Center (NPFC).

Representatives from the SYSCOMs and NPFC have agreed to print bar codes and stock numbers on tech manual covers to make them easier to stock and issue. At the same time, NPFC is investigating updates to its computers and software that would improve its ability to cope with the enormous growth in the number of tech pubs.

NAVAIRSYSCOM, as lead Systems Command for the tech manual management program, has tasked the Naval Personnel Research and Development Center (NPRDC) to assess a group of tech manuals to determine if there were any systemic problems during their development. NPRDC will also evaluate a Technical Manual Adequacy Guide (TMAG).

Meanwhile, the Systems Commands are improving the quality of their tech manuals. They've established priorities to correct the backlog of reported deficiencies and set up procedures to deal with them. The deficiencies that you report are evaluated and, if correct, the tech manual is changed. So don't despair – keep writing up deficiencies you find in your manuals. With the exception of NAVAIR forms (available in pads through supply), deficiency reporting forms can be found in the back of the tech manuals. The specific forms are:

SYSCOM	Title	Form No.
NAVAIR	Technical Publication Deficiency Report (TPDR) (content problems)	OPNAV 4790/66
NAVSEA	Technical Manual Deficiency Evaluation Report (TMDR) (content problems)	NAVSEA 9086/10
SPAWAR	User Activity Technical Manual Comment Sheet (UATMCS) (content problems)	SPAWAR 4160.1A
ALL	Report of Discrepancy (ROD) Manuals (stock problems)	FS 364

The function of the deficiency report is to tell the SYSCOM what is wrong with the tech manuals. If you find something wrong, report it. While administrative and typing errors should be corrected, we are primarily concerned with technical deficiencies that impact operations and maintenance. The SYSCOMs want to improve technical manuals in the fleet, and they need your input because real improvement to tech manuals is based on user feedback. Keep sending in those reports. ★

LCdr. Richard Veltman compiled this article while he was SPAWAR 003-232. He has since retired from the Navy.

Editorial

I suggest you give the Devil's Advocate article more than just a passing glance. The trends and forecasts compiled for 1990 represent the effort of a lot of people. Find the particular aircraft model you are working with and then vow to prevent some of those forecasts from coming true.

My Nov/Dec '89 editorial announced I would retire on 30 December, allowing about two months for reader contacts. Unfortunately, although we met our production milestones, an event outside our control happened — our contract printer went out of business. Looking for a new printer will delay our Nov/Dec '89 issue for six or more weeks. If it hasn't arrived yet, don't worry; it will be there shortly.

However, my "swan song" editorial will now be so late that I will [illegible] have already retired [illegible] the fleet. Yet, I say [illegible] the urge to get in [illegible] don't hold back — [illegible] have comments about the content of Mech, my successor will have to handle them. Items addressed to me personally should eventually reach me (I will answer them as soon as I can).

Again, many thanks for all the help you've given me in getting Mech together during these almost 20 years — I'm going to miss you all.

Russ Marcoux

Mech

The Naval Aviation Maintenance Safety Review
Professional Bullentin 01-90

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Col John P Oppenhuizen, Deputy Commander
Capt. W J Mooberry, Chief of Staff
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In This Issue

Editor: Russell L. Marcoux
Technical Editor: Cdr N.J. D'Acquisto
Art Director. Robert Trotter

Purposes and Policies Mech is published bimonthly by the Naval Safety Center and is distributed to naval aeronautical organizations on the basis of one copy per 10 readers. It presents a broad spectrum of aviation maintenance matters on such topics as maintenance-caused mishaps/errors, personnel/material hazards, management safety programs, etc., as well as aviation ground safety in general.

Material presented is informational and not to be considered as regulatory or directive in nature. Reference to commercial products does not imply Navy endorsement. Material relative to mishaps may not be construed as incriminating under Article 31, UCMJ. OPNAVINST 3750 series refers.

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Correspondence Articles and other contributions are welcome. The right to make editorial changes to manuscripts to improve presentation without altering the intended meaning is reserved.

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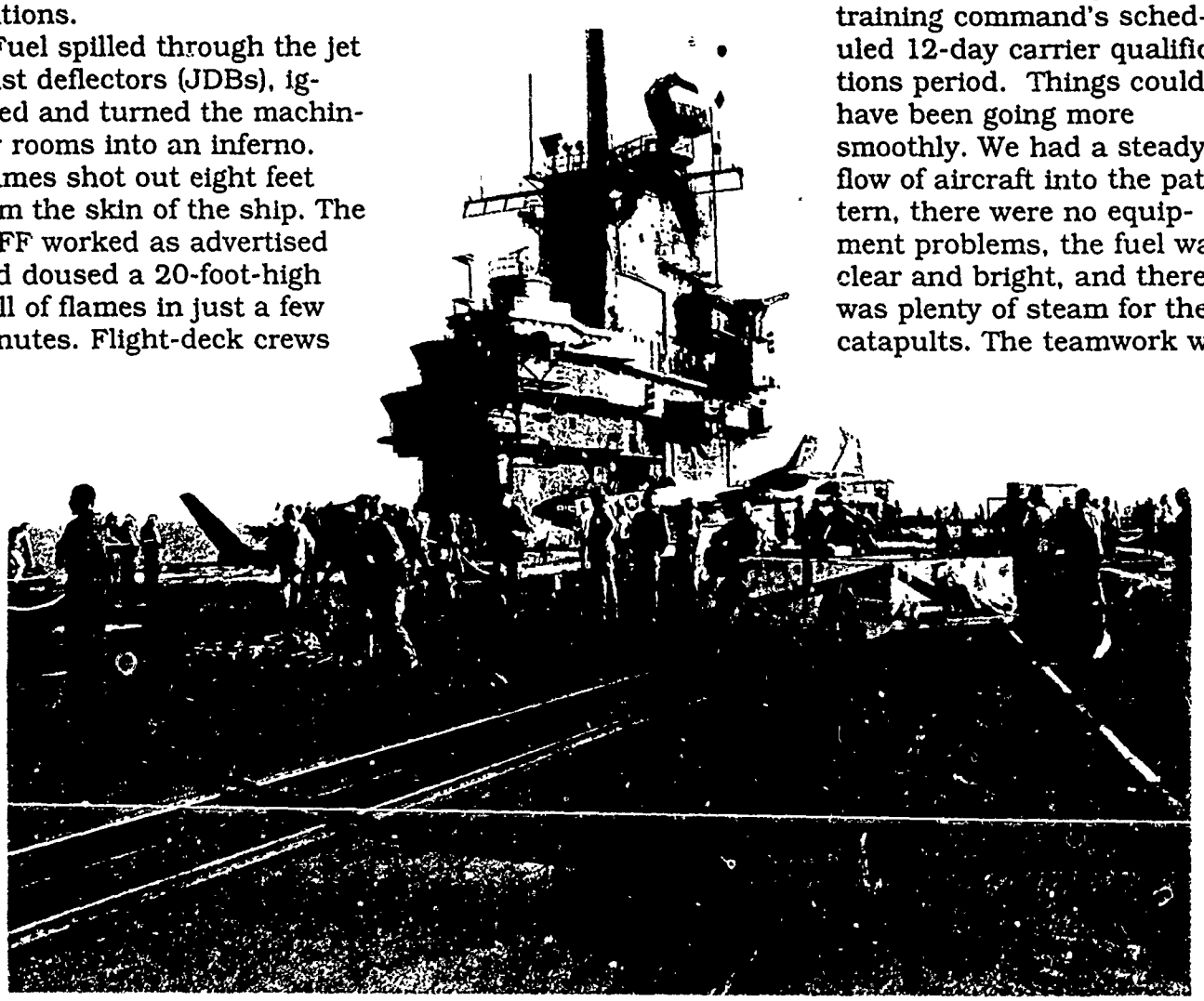
"FIRE! FIRE! FIRE! There's a fire on the flight deck, cat 1 JBDs. Man all HICAPS and Repair Lockers 7F, 7B and 7A. Nucleus Fire Party assist. Medical response to the flight deck."

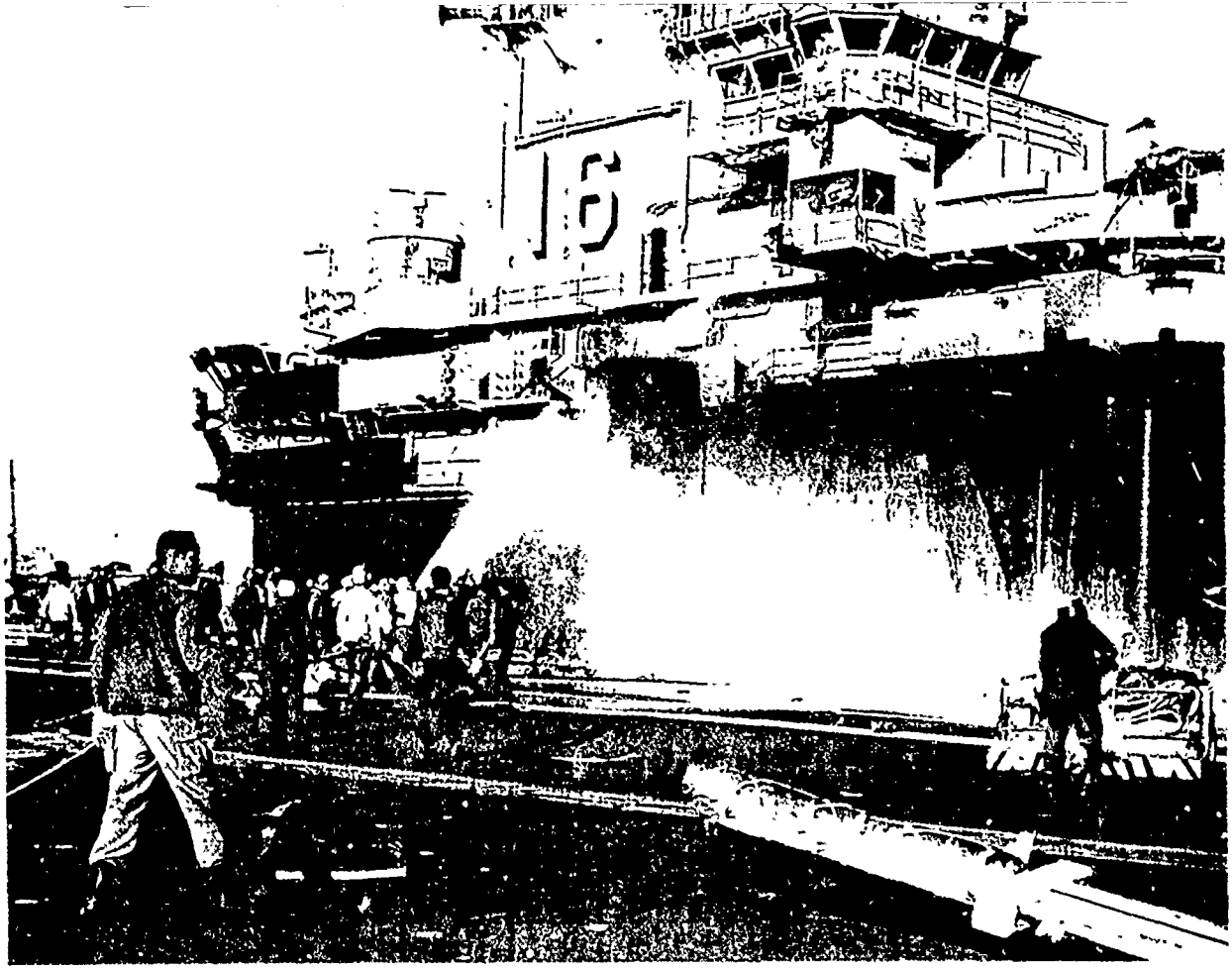
By Lt. Neal R. Miller

We've heard these words before, only this time they weren't followed by, "This is a drill. This is a drill." Before the burning debris of the aircraft even came to a stop, people wearing red, green, yellow and purple shirts were rushing to the nearest fire stations.

Fuel spilled through the jet blast deflectors (JDBs), ignited and turned the machinery rooms into an inferno. Flames shot out eight feet from the skin of the ship. The AFFF worked as advertised and doused a 20-foot-high wall of flames in just a few minutes. Flight-deck crews fought the fire as far into the below-deck spaces as they could before being overcome by smoke. Then Nucleus-Fire-Party members (with OBAs) took over. The entire crew responded immediately and selflessly to limit casualties and damage.

Hours later, while sitting on a chock on the now quiet flight deck, I had an opportunity to reflect. The day started clear and cool. I remember thinking, "What a great day to fly." We'd been at sea for seven days of the training command's scheduled 12-day carrier qualifications period. Things couldn't have been going more smoothly. We had a steady flow of aircraft into the pattern, there were no equipment problems, the fuel was clear and bright, and there was plenty of steam for the catapults. The teamwork was





Firefighters hosing down the island.

gratifying to watch, and I felt proud to have a small part in it all. There was even talk of pulling in early because we were completing our commitments ahead of schedule. Maybe I'd finally be able to take my daughter trick-or-treating for Halloween.

My first of two hours as Launch Officer was drawing to a close. The next aircraft to launch was not yet ready, so I stood near the center deck hatch and watched the aircraft in the pattern. The pilot of a T-2 on final was being waved-off from a low and slow approach. I could tell something was terribly wrong with this pass. In close, the aircraft pitched up and over Tilly, rolled left and then abruptly rolled right until

Fire on the Flight Deck

My greatest hope is that the readers of this article will be reminded of the dangers inherent in our profession, on deck as well as aloft.

inverted, struck the island and crashed on the flight deck in flames. It all seemed so surreal, as if it had happened in slow motion. The deck crew had already started to scatter as 2,500 pounds of fuel erupted.

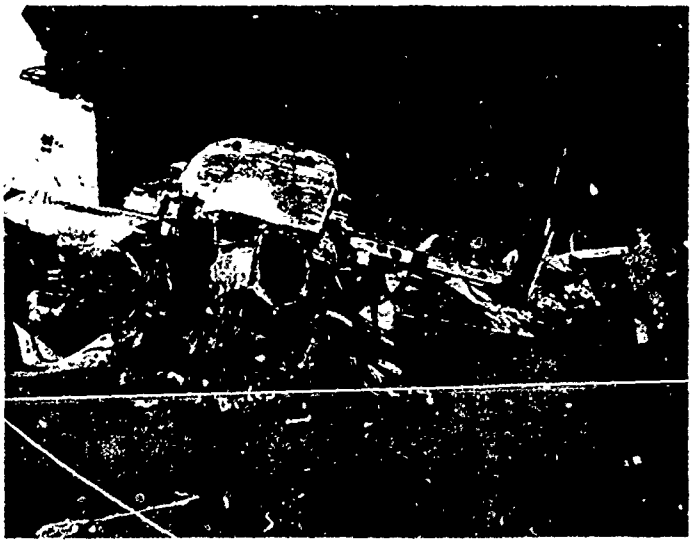
The wreckage slid along the base of the island, miraculously missing two T-2s spotted aft and inboard of the JDBs. Before the wreckage came to a stop, the crewmen were running, not for their lives, but directly to the fire hoses. The crash alarm brought the entire crew together for one purpose: to save our mates and the ship. As hoses were unwound,teams converged to man them. On-scene leaders used anyone not manning a hose as stretcher bearers, elevator operators and reliefs for the hose men. Off-duty personnel came to the hangar, not to rubberneck, but to lend a hand. Medical response was called for in several spots of the deck at once. Unfortunately, some of the injured did not survive.

Fighting the fire from upwind, most of my view was blocked. However, I distinctly remember watching the pilot of another T-2 aircraft (spotted adjacent to the wreckage) egress from his aircraft. I cannot get over my impression that he appeared completely lost, unsure of which way to go or what to do. In retrospect, this makes sense since this was his first time "at the boat." My attention was quickly drawn from him as flames erupted from the catwalk exit of the JBD room.

As I swept the fire with the AFFF, many thoughts came to me clearly and rapidly: "Where's the medical response team to the bow? Is my mike working or did the salt water get to it? Do we have a good muster? Are any of my men down? I can't believe this is happening. The AFFF really works. How's the catapult? I'm sure glad I went to fire fighting school. I wish I had an OBA to better fight the fires below. Oh, good, there comes the Nucleus Fire Party guys."

It was all over in less than 10 minutes. Then came the time to treat the injured, evaluate the damage and clean up the angle deck. We needed a place to land and launch helos so they could medevac survivors to the beach. The wreckage was moved so we could raise the JBDs to vent the burned-out spaces below. I started thinking about the emotional aftermath, the effects on my men and me.

Maj. J. R. Vallaster



What the mishap investigators have to work with.

Still resting on the chock, I mulled over some lasting impressions of this mishap. These are thoughts this ship's-company aviator feels the need to share with his brown-shoe buddies in the squadrons:

1. The flight deck is indeed a hazardous place. Being part and parcel of Naval Aviation, it is an environment completely unforgiving of error

or inattention – there's simply no room for complacency. "Keep your head on a swivel" and "Watch out for your shipmates" have to be as much a part of your brief as are tactics and rules of engagement.

2. Squadron aircrew members tend to avoid the flight deck except for man-up and post-flight. However, flights start and terminate there. It is a virtual certainty, therefore, that some aircrew will be on deck during any accident. Look at it this way: you know your aircraft's EPs (emergency procedures) cold. But, how well do you know your flight deck EPs? When was the last time you actually looked at the deck-edge fire stations? Do you really know how to use one? Do you think about their location each time you go out on the deck? Next time the deck is open for jogging, why not forego the hard 20-minute workout and take a slow, careful walking tour instead? Check things over. How far will that hose reach, anyway?

3. Team work is the key to successful fire fighting. In the event of an accident, someone has to take charge and give direction. So what if you're a Fleet Lieutenant? Let the expert tell you what to do, even if he's a Second Class Aviation Boatswain's Mate. Follow his lead. Finally, if you can't help, get out of the way. You may be needed later.

Maj. J. R. Vallaster

Inport, getting ready to off-load what remains of the mishap aircraft.

4. Fire fighting is physically and emotionally exhausting. The adrenaline flows so fast that you don't know you're tired or hurt. It wasn't until several hours after the crash that I realized how sore my back and arms were. The hose teams must be relieved from time to time.

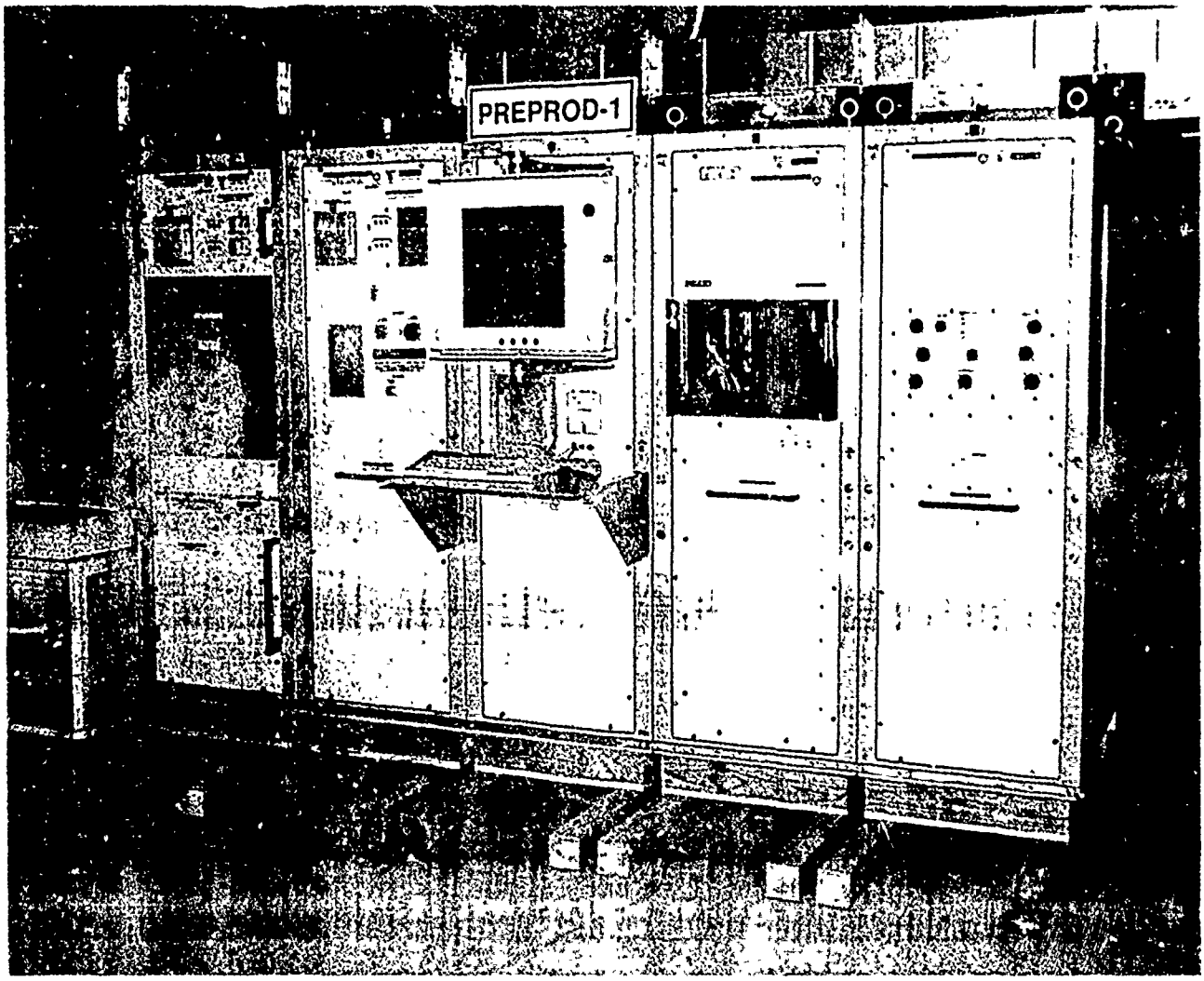
5. I've always felt that, except for flight training, the best Navy school I completed was Aircraft Fire Fighting. Now, I am certain of it. We train the way we're going to fight. How long ago did you go to Fire Fighting School? How well do you remember what you were taught? The next time a flight deck fire drill is called away, why not put on flight-deck gear and go watch from vulture's row? You're a lean, mean fighting machine in the air, always ready, always vigilant. Will you be as ready on the deck?

I've met fire and death in a way I'd hoped to avoid but for which I have always tried to be prepared. Events of that tragic day will stay in my memory forever. Shipmates good and true were lost. However, even tragic events can have positive aspects. My respect and admiration for courageous crew members has grown immensely. I've gained great confidence in the capabilities of shipboard fire fighting equipment. My convictions on the importance of drills, training and readiness have strengthened.

The immediate and selfless response of the crew kept the fire contained and prevented a greater catastrophe. Most importantly, these lessons will stay with a new generation of flight deck crew members. They will ensure, during future tours on other ships and stations, that their men are properly trained and ready.

My greatest hope is that the readers of this article will be reminded of the dangers inherent in our profession, on deck as well as aloft. Accident rates are low, not because of the absence of dangers, but because we have mastered them to the best of our abilities. Part of that mastery must include readiness for any eventuality on the flight deck. ★

Lt. Neal R. Miller is the V-2 Division Officer aboard USS *Lexington*. (AVT-16).



CASS - The Navy's Automated Test Equipment for the '90s and Beyond

By Capt. David P. Mozgala and Ms. Marianne Martin

THE 1990s are here and, with that, the next generation of Automated Test Equipment (ATE) is about to be introduced to the fleet: the Consolidated Automated Support System (CASS). The ATE now in use is limited in its testing capabilities and cannot be easily or economically expanded or modified. Other serious deficiencies include:

- The equipment cannot shift workload between testers.
- It isn't reliable; it is hard to maintain and logistically difficult to support, which itself

causes a maintenance problem.

- Parts rapidly become obsolete.
- Proliferation of ATE, not to mention the lack of standardization in spares, publications and training.
- It takes up too much room.

CASS is the Navy's solution to these problems – the state-of-the-art in multipurpose ATE designed to accommodate the testing criteria of present and future electronic systems and components.

The CASS program is in the full-scale engineering development phase and is undergoing design verification testing at General Electric (GE) Company, Huntsville, Alabama. GE is scheduled to deliver pre-production CASS stations to the Navy in April of this year for formal Navy technical evaluation (TECHEVAL) and operational evaluation (OPEVAL). When CASS has been fully tested and all problems fixed, CASS stations will be provided to weapon system Test Program Set (TPS) developers, CASS training sites and CASS depots in preparation for fleet delivery. CASS stations will be provided to the fleet **only after all logistics elements are in place:** when fleet personnel have been trained, spares are available, depot support has been established and all resources necessary to maintain CASS have been delivered.

Moving away from the usual "rack and stack" approach to ATE, CASS implements a modular-functional approach that is avoiding a separate instrument for each function desired. For example, in the case of a digital voltmeter or oscilloscope, CASS places the basic functions of the instrument (voltage measurement, signal generation and so forth) on a standard-sized CASS circuit card within a standard but flexible architecture. The need for redundant switching, knobs and displays is eliminated. By using micro-processors (Motorola 68000 computer), various instrument functions can be created by combining CASS circuit cards. The Hybrid station, pictured on page 6 (commonly referred to as the "core"), is 90 percent common to all of the six configurations. By combining a Hybrid station with specific requirements (for instance, an electro-optic subsystem or a display subsystem), a particular configuration of CASS is created.

A significant goal of the CASS program is to eliminate the need for active interface devices (IDs) by designing extensive test capabilities into the tester.

A noteworthy feature of CASS is its paperless publication system. Everything in all the technical manuals (which include operations manuals, maintenance manuals and illustrated parts breakdowns) will be stored on an erasable optical disk within the CASS station.

CASS will provide the Navy and Marine Corps with an improved way to support our weapon systems in the fleet. With its high reliability, total integrated logistic support package, built-in technical capability and growth room for new technology, CASS will significantly improve weapon systems turnaround times and, more importantly, increase fleet operational readiness. ★

Capt. David P. Mozgala, USN, is the CASS Program Manager (PMA-260) and Marianne Martin is the CASS Program Planning Officer (PMA-260C) at NAVAIRSYSCOMHQ, Washington, DC.

The state-of-the-art in multipurpose ATE designed to accommodate the testing criteria of present and future electronic systems and components.

Excitement!

By ATAN Jeff A. Howard

YOU can easily get excited on the flight deck, which can cause you to act impulsively or do stupid things – I know, because it happened to me.

We were moving jamming pods to the roof to prepare Prowler 607 for a later event. We had to use No.4 deck-edge elevator while a launch was going on. I don't like being back there during flight operations, so I was a little apprehensive. When the elevator reached the flight deck, I looked around and quickly took off with the pod, just like the other two guys did with their drop-tank. I didn't see a Tomcat coming towards me! When I did see it, I stopped just in time to avoid being run over, but not in time to avoid being hit by the exhaust after he'd passed me.

The Tomcat taxied up to cat 3 and the JBDs went up, so I took off again – only to find an A-6 crossing my chosen path. A yellow shirt stopped the Intruder and waved me back. A short time later I finally arrived at 607 with the pod – safe, and with a lesson well learned. On the flight deck it's dangerous to rush in doing anything because that can lead to disaster. In both these instances I could have been sucked up into an intake – or blown overboard with a 1,000-pound jamming pod.

I was lucky this time. I learned that, if I want to keep out of trouble, I must keep my head on a swivel and be constantly aware of what's going on around me.

ATAN Jeff Howard is a member of the VAQ-137 "ROOK" aviation electronics technician work center embarked with CVW-1 on board USS *America* (CV-66).

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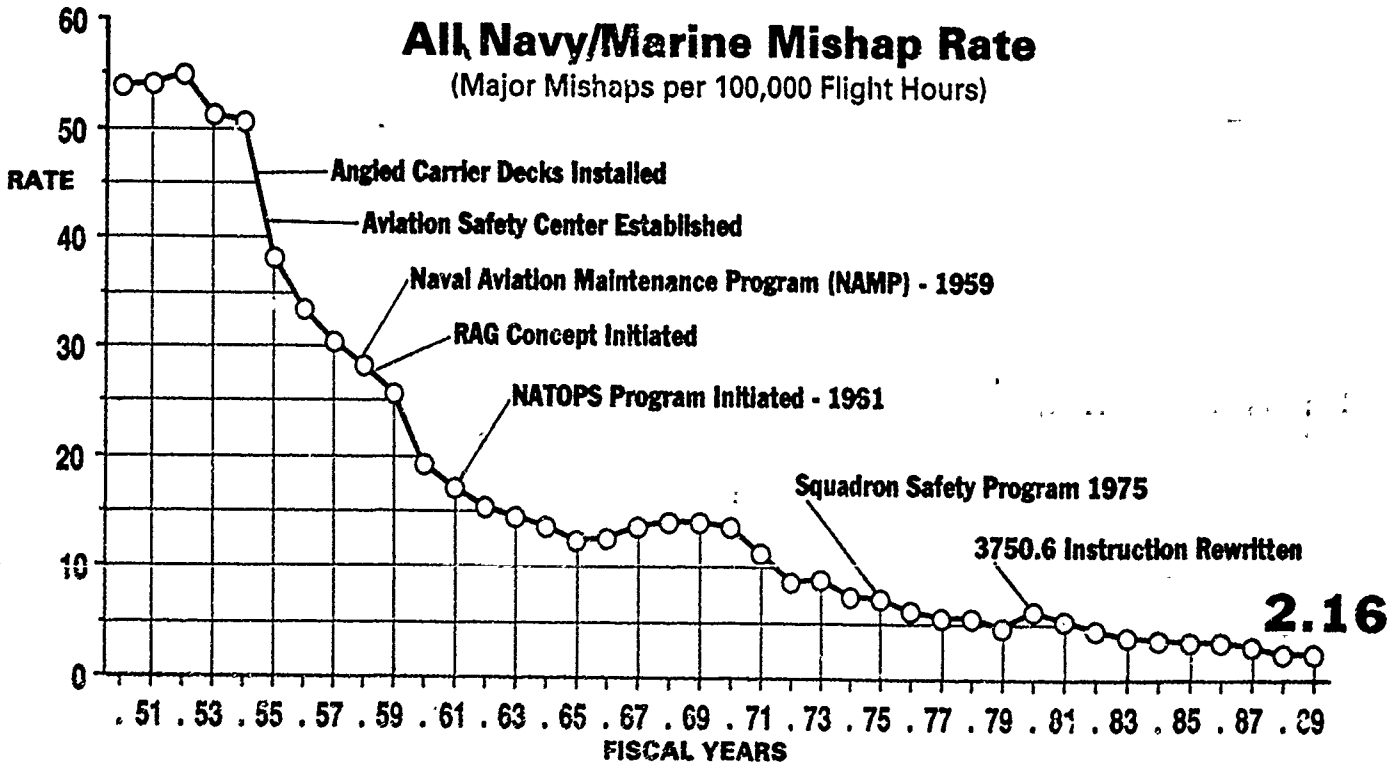
JANUARY/FEBRUARY 1990

AVIATION MAINTENANCE

CROSSFEED

Contents

Crossfeed is intended primarily for Maintenance Department Personnel.



Prepared by Naval Safety Center, Capt. L.F. Norton, Commander
Naval Safety Center, Autovon 564-3494, Commercial 804-444-3494

AVIATION MAINTENANCE AND MATERIAL DIVISION

Cdr. E.R. O'Rourke, USN
Cdr. N.J. D'Acquisto, USN
ATC(AW) T.G. Grigsby, USN
(Editorial Coordinator)

MAINTENANCE MANAGEMENT

Take Care Of It!

By ADC(AW) D. W. Kutchko

Upkeep and periodic maintenance on support equipment are some of the most important responsibilities in naval aviation. Without quality equipment in good working condition, the maintenance effort is severely hampered. Broken aircraft cannot perform their missions. The Naval Aviation Maintenance Program (NAMP), OPNAVINST 4790.2E, tasks production work centers, Quality Assurance and Production Control with ensuring that support equipment inspections are performed in a timely manner. To accomplish this, a comprehensive training program must be in place to instruct personnel on the use and care of your command's peculiar support equipment.

Scheduled inspections of support equipment must be documented on OPNAV Form 4790.51 (SE Custody and Maintenance History Record) in order to establish and continue required scheduling of periodic maintenance. Along with the regular scheduled inspections found in the MIMs, MRC decks and manufacturer's servicing handbooks, an inspection before use must be made and documented on OPNAV Form 4790/52 (SE Preoperational Inspection Record). These forms are retained within the work center for one month. The information on periodic hose-assembly replacement requirements is specified in Section 5 of NA 01-1A-20, The Aviation Tube and Hose Manual. Last but not least, there must be an ongoing SE corrosion control program.

Take care of your SE. Whether it's a valve housing test bench at depot level or an ambient air-breathing pump in a command. support equipment must be kept ready to support the Navy's aircraft.

The Changing of the Guard

By Cdr. R.E. Kirkland

The Aviation Maintenance and Material Division (Code 12) of the Naval Safety Center has gone through a major change in personnel. Rotation and losses moved a lot of folks. But we've gained some people who are sure to provide even greater service to the safety goals of aviation maintenance.

These new folks coming in are truly talented. They reflect the Navy's aggressive attitude towards naval aviation safety in general, and aircraft maintenance safety in particular.

For starters, I have transferred to the Naval Aviation Maintenance Office at NATC Patuxent River. My relief, Cdr. Ernie O'Rourke, is a maintenance legend with 38 years of experience – including two tours as a CAG MO. (I guess he got it right the second time.)

Capt. John Krause, USMC, rotated back to the Marine Corps and MAG 26. His relief, Capt. Kirt Hirata, USMC, with recent experience on an F/A-18 fleet introduction team, comes to us from MCAS Kaneohe.

CWO4 Tom Dunn, with recent background in VAW,

is replacing CWO4 Paul Kozoroz in our SE Section.

CWO3 R. Law will soon arrive from the USS *Inchon* to replace CWO3 R. Valdillez in the Avionics Section. CWO3 R. Valdillez transfers to the USS *Tarawa*, homeported in San Diego.

ASCM Jerry Paul is relieving ASCS D. Koenker, who is Fleet-Reserve bound.

AFCM J.J. Schaller transferred to VF-14 and was relieved by AMCS Bob Novak from VF-74.

AMCS J.D. Blair retired and was relieved by AMSC Thomas (TK) Folds, with recent experience in COMTACSUPWING ONE and that interesting collection of squadrons, aircraft and missions.

The team of Naval Maintenance and Maintenance Division safety analysts will be in place and ready to serve you through a safe and productive relationship into the 1990s. In this issue you will find a Code 12 organizational chart with telephone numbers and codes.

Departing Thoughts

By Capt. J. T. Krause, USMC

The moment has come to move on to another challenging assignment. The past three years at the Naval Safety Center have been a continuous opportunity to serve, observe and learn.

Seldom does an Aviation Maintenance Officer get the chance to take a first-hand look at a majority of the activities in the Navy and Marine Corps aviation community. It was a unique experience. I leave to each of you some brief thoughts to think about:

- *Marines and Sailors.* They must be fed, clothed, billeted, trained and led. The cost is millions of dollars each year; yet, we cannot affix a dollar value on their lives. They are our most important asset. Their safety must be a foremost consideration at *all* levels of leadership.
- *Aircraft.* Billions of dollars to buy and billions more to fly and maintain. Properly maintained, they will be ready to safely perform their intended missions.
- *Squadron.* An organization of Marines or Sailors, aircraft and equipment with one or more missions. Successful mission accomplishment depends on many factors, not the least of which is a strong squadron safety program.
- *Safety.* The effort put forth to avert injury or loss. Safety is achieved through training and awareness. It is an *All Hands* responsibility.

My relief, Captain Kirt Hirata, USMC, is on board. I am sure that he will find it to be a most challenging and rewarding assignment, as I did. To all you maintenance professionals: Good luck and keep them flying. As ever, "Thanks for the opportunity to visit!"

Quality Assurance Supervisors' Challenge (Part II)

By ATC(AW) Tom Grigsby

In the July/August 1989 edition of Mech, we issued a challenge to all **Quality Assurance Supervisors.** We wagered that some QA/A supervisors didn't even read the safety literature you are reading right now, much less ensure that it is properly distributed within their maintenance department. We challenged them to prove us wrong by writing and saying, "You are wrong." As a result, we printed a list of the names and commands of respondents in our November/December issue.

As of the 25th of August (our publishing deadline for the NOV/DEC edition), we had 119 responses. Since then, we have received another 39 responses. It has been more than five months since publication of the original challenge, and the replies have slowed to a trickle. Some responses included a number of suggestions and good ideas.

For example, one unit provided a copy of their safety indoctrination checklist. This is a key item on our safety surveys and will make a good Crossfeed article. We strongly encourage all hands to submit your ideas for publication; there's a lot of outstanding information out there that can make everyone's job easier.

As was noted in the first article, several respondents were disappointed with the distibution of incoming safety publications within their units. They suggested addressing material to QA to help resolve

this problem. I checked our mailing system here at NAVSAFECEN and, unfortunately, we can't comply. Our computer address system is a standard mailing list for all NAVSAFECEN publications, many of which are not directed solely to the maintenance departments. If you, the QA supervisor and the ASO talk with the persons responsible for delivery of official mail within your unit, your coordinated effort should be able to resolve the internal distribution problem.

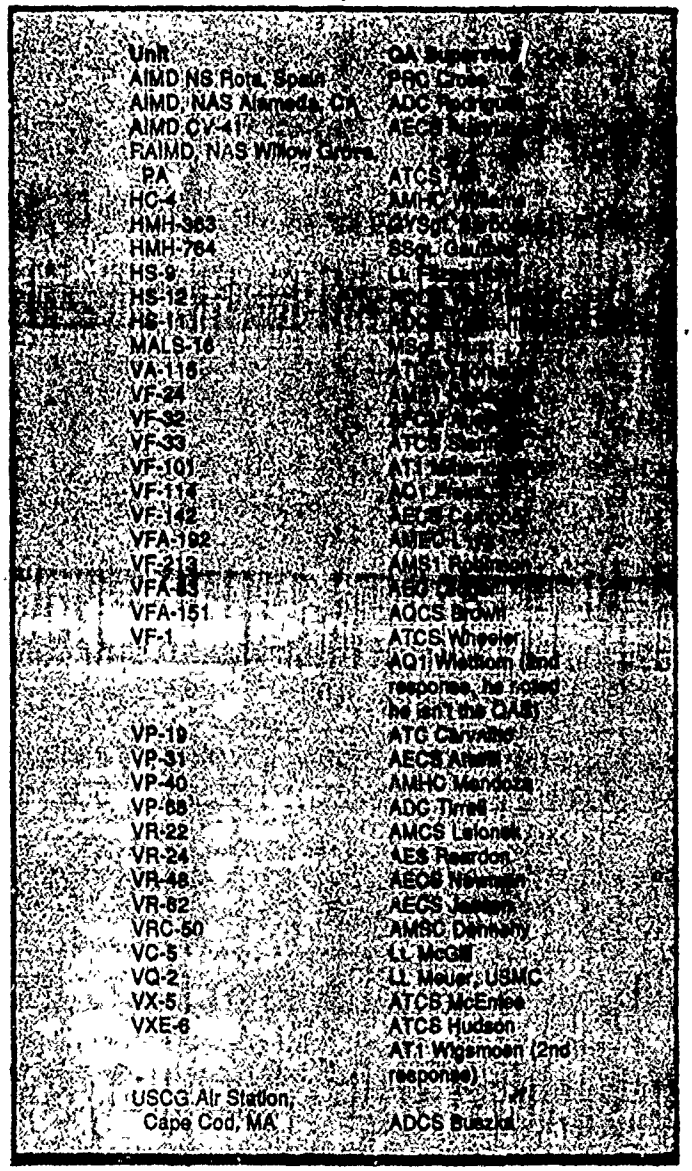
We recommend that one copy of MECH be first routed to the CO and XO for information and then retained by the ASO. If any copy ends up lying around the ready room, it should be that copy. The QA/A supervisor should personally ensure distribution of the remaining copies to the MO and the supervisors of all maintenance staff and production divisions for dissemination to their personnel. Don't forget to retain one copy in the QA/A division. Some squadrons require each shop to post a copy of Crossfeed on the required reading board.

One writer suggested that we list the Autovon number of our QA/A. Well, actually, we don't have a QA! Don't faint! We are organized to monitor aircraft systems (power plants, avionics, airframes and so forth). Each analyst is essentially a QAR. We draw our QA expertise from these sections, according to analyst experience and training in the QA. Data analysis is included in our organization, so maybe we should consider including a full-time QA section also. This will be a point for further internal discussion. Like fleet activities, anything extra will probably have to come out of hide. In any case, our Autovon number for Code 12 is 564-3494; Commercial is 804-444-3494.

Posters were also mentioned. One writer asked us to increase the size of the fold-up posters that were included in the magazine. Unfortunately, these fold-up posters constitute extra pages and make the magazine much more expensive to mail, so we had to stop putting them in the magazine. Another writer suggested that the back cover posters be perforated to make them easier to remove. We can do that. Yet another writer asked for poster stock numbers, so he could order them. The safety posters are not in the supply system. You can get them by simply calling or writing to us. Our address is printed in each copy of Mech on the editorial and masthead page.

Well, let's get on to the list. Remember, we challenged the QA/A supervisors; therefore, we assume that the person who responded for your unit is the unit's QA/A supervisor. Of the 584 Navy and Marine Corps aviation maintenance activities on our address list, we received reponses from 157. We were hoping for far more than that, but we're not too disappointed nor disheartened: Professionalism and dedication were an underlying theme in every letter. This project was truly a pleasure to be a part of; thanks for taking the time to respond.

Here are the latest respondents:



Who's Really To Blame?

By ASCM J. W. Paul

All too often I read messages about sailors getting seriously injured while moving aircraft. An investigation is conducted, and usually the injured person is blamed because he or she was not properly qualified to perform the assigned task. Then the incident is slowly forgotten. But if you stop and think, it's not entirely that young person's fault.

Let's set up a scenario. How about the "Friday

afternoon hangar bay shuffle?" Everybody's familiar with this one.

On Friday afternoon, the Maintenance Master politely calls the line shack and says, "Move XX-2 and XX-7 out of the hangar, and bring XX-5 and XX-8 in." The line replies, "OK, Master, but I'll need two wing walkers to assist."

So the Master Chief politely asks, "Where in the $#@** are all your people?"

Line replies, "Well, Charlie's off 'cause his dog died and Skip's gone 'cause his car insurance expires at 1337 this afternoon."

"OK, OK," the Master says and commences calling the other shop supervisors for wing walkers.

The shop supervisors are busy trying to wrap up their paper work so they can leave at a decent hour to start their weekend. The shop supervisor yells without looking up, "Somebody get out there and help move that aircraft." There's a couple of new guys sitting in the shop. In fact, they are the only guys sitting in the shop. The old hands anticipated this move and stepped out for awhile, at least until they see the tail of XX-2 start to move out of the hangar. The new guys have been around about a week, and they've both seen this evolution done a couple of times. It didn't seem that difficult, so they decide to give 'em a hand. Anything to get the job done, right?

By now, it's late afternoon and everybody's aggravated. Nobody wants to move aircraft; it's too close to quitting time. By the time these young lads get out there, the director is probably not going to ask if they're qualified. He wants to get this move over with because as soon as it's done, he gets to go home. So he throws the new guys a whistle and tells them to each get on a wing.

Looking at the way things are developing, would you want to be part of this evolution? Seems pretty shaky, doesn't it? This is asking for trouble, and we all can see it. If one of those new wing walkers gets hurt or the aircraft hits something, we'll jump right in and blame the new guy. The system will chew him up one side and down the other – but for what? He was only trying to do what he was told. To him the task seems simple enough, and his supervisor obviously had the confidence in him to do the job. After all, he sent him out there – right?

It's our job as supervisors to make sure our troops are qualified before they are assigned to tasks. Moving an aircraft may be one of the most simple tasks we perform in a squadron environment when we've been properly trained, but, oh how costly it can be if performed incorrectly. A foot will never be the same after an aircraft has been towed over it. And what is the price of a life these days?

We have a moral obligation to train our new personnel, and to train them right. Much of our work is taken for granted, and we figure the new lads should know some of it – like what chocks are for or what a tie-down chain and turnbuckle is. They don't know when to chock or unchock an aircraft or understand the director's hand signals unless you train them. Can you really hold them responsible if they haven't been properly trained?

Let's stop the senseless injuries that happen during normal ground operations. If we keep 'em trained, we'll keep 'em safe!

Checklists - A Technician's Tool

By ADC(AW) D. W. Kutchko

Checklists give maintenance personnel one way of ensuring that all inspection requirements and adjustments of equipment are made before one uses the equipment. Checklists can point out corrosion-prone areas on aircraft, critical hardware to inspect on support equipment and even the proper switch positions on engine test boxes.

Whether found in Maintenance Instruction Manuals, or issued from your command safety representative or Quality Assurance Division, the goals of all checklists are the same: Safely flyable aircraft and safety of personnel engaged in aviation maintenance. Two examples of checklists appear in NA 01-1A-35, Aircraft Fuel Cells and External Tanks. Paragraph 2-8 and paragraph 6-2(d) give detailed information for developing an emergency fuel cell evacuation plan and job guide for use in positioning aircraft for fuel cell maintenance.

So, take a tour through your publications and familiarize yourself with the many checklists that they contain. Develop those needed within your own command to head off what could become a hazardous situation. Flammable storage, FOD prevention and consumable parts usage are just a few areas where checklists can help. Remember, checklists have been, and will continue to be generated to aid weapons system technicians.

Use them!

POWER PLANTS

The Detection of Contaminated Fuel

By ADC(AW) D.W. Kutchko

Contaminated aircraft fuels can only be detected and prevented through the use of proper equipment and sampling procedures. Acceptable fuel must be clear, bright and contain no free water. The terms "clear" and "bright" are independent of the normal color of fuel. Clear means highly transparent and refers to the absence of any cloud, emulsion or easily seen particulate matter. Bright refers to the shiny appearance of clean, dry (water in suspension not present) fuel. If the fuel is cloudy, hazy, has specks in it or the color is not right, the fuel is unsuitable. These are abnormal and an indication of a possible breakdown in the fuel-handling equipment or the sampling procedures.

NA 01-1A-35 (Aircraft Fuel Cells and External Tanks), Section 3, lists the procedures to be used when taking fuel samples. These are:

1. Ensure you clean the exterior of the low-point drain before taking a fuel sample.

2. Using a one-quart, clear, clean glass or polyethylene container, drain off one pint of fuel from the low-point drain.

3. Inspect the sample for loose drops of water puddled under the fuel.

4. If you detect water, discard the sample and repeat steps 1 through 3 until no free water is detected or until you have taken the maximum number of samples your fuel surveillance maintenance instruction states to take prior to informing Maintenance Control, Quality Assurance and Powerplants to initiate corrective action.

5. Swirl the sample by briskly rotating the container.

6. If water is still visible under the swirling vortex of fuel, draw another sample and reinspect.

7. Inspect the fuel sample for discoloration, cloudiness and loose sediment under the swirling vortex.

8. If you can see small amounts of particulate material, discard the sample and draw another. Inspect the new sample.

9. If relatively large amounts of water or foreign matter are noted, or small amounts persist in samples drawn from one or more cell drains, do the following:

a. Ground the aircraft and notify Maintenance Control, Quality Assurance and Powerplants immediately.

b. Retain the fuel samples.

c. Defuel the aircraft.

d. Immediately investigate the aircraft's fuel system and components to find the source of contamination.

e. If the source of contamination is not isolated to the aircraft, notify the cognizant fuel-handling facility. The source of the contamination *shall be* identified.

f. Forward the contaminated fuel samples to the nearest Navy Petroleum Laboratory for analysis. NAVAIRINST 13340.3 identifies these laboratories and the approved shipping containers.

The following examples demonstrate what contaminated fuel can cause:

1. The CH-53 was undergoing an acceptance inspection when erratic cockpit fuel flow indications were noted. The aircraft was shut down, and fuel samples were taken. One of the samples revealed paint chips in the main tank. The aircraft had just returned from fuel cell rework maintenance.

2. After an H-46 took on fuel from shipboard fuel storage tanks, a fuel sample was taken before its next flight. A check of the sample did not reveal any signs of contamination. Although the aircraft started all right, it flamed out immediately after takeoff. An investigation discovered that the aircraft's fuel cells and the shipboard fuel storage tanks to be completely full of sea water.

3. During flight, the port engine of a C-12 aircraft flamed-out. No relight was attempted, and the aircraft made an uneventful landing. A fuel sample taken from the left wing after the landing showed discoloration and contained particulate matter. A fuel sample was not taken when the aircraft was refueled before the flight.

Using the fuel contamination limits contained in NA 01-1A-35, Section 3, Table 3-3, conduct a training session with the plane captains, crew chiefs and other maintenance personnel who deal with your command's fuel surveillance program. Discuss the acceptable limits of aviation fuels and the characteristics of contaminated fuel samples. This will help ensure your aircraft are always free from contaminated fuel and the associated consequences.

LINE/SUPPORT EQUIPMENT

"Goggles? I Don't Need No Stinking Goggles!"

By ADCS Mike Whitney

After reviewing ground mishap reports from the past years, I noticed an interesting trend. Most eye injuries caused by chemical burns happened while personnel were washing aircraft. Some were wearing goggles and took them off, others were not wearing the proper type of goggles, and others failed to wear goggles at all. The following narratives were taken from mishap reports. Review them to understand why you need to wear proper eye protection while washing aircraft.

- A PO3 was wearing vented safety goggles while washing the belly of an aircraft. Within minutes, the washing solution had seeped into the goggles and entered his eyes. The PO3 quickly washed out his eyes and suffered only minor eye irritation.
- At home, after securing from an aircraft wash, a PO3 noticed a burning sensation in both eyes and that his vision was foggy. It was later determined that aircraft washing solution had entered his eyes, causing severe chemical burns to both eyes.
- While an AN was handing a container of TURCO to a shipmate working on top of an aircraft, the bucket slipped from the shipmate's grasp, causing a spill. Some TURCO spilled into the AN's eyes, causing chemical burns to both eyes.
- While cleaning the aircraft, the PO3's goggles began fogging. He removed them and was splashed in the eye with TURCO. A quick and thorough eyewash left the PO3 with only a slight eye irritation.
- During an aircraft wash operation, an AN was under the aircraft wing when some washing solution splashed into his eyes. The goggles he was wearing were ineffective in keeping out the solution. The AN had to be treated for chemical burns to both eyes.
- An AN was washing an aircraft wheel well. Splash-back from a spray hose caused some washing solution to accumulate on top of his goggles. He removed his goggles, and the solution ran down into his eyes. The result was severe eye irritation.
- A maintenanceman entered the nosewheel well without goggles during an aircraft wash. While washing the wheel well, soap got in his eyes. He received burns to both eyes.
- Two workers were washing the underside of an aircraft while lying on creepers and scrubbing overhead. Although goggles were worn, the goggles were not designed to keep chemicals out. Both workers received burns to their eyes.
- An AN removed her goggles while washing under an aircraft. This resulted in eye irritation.
- While washing the lower part of an aircraft, a PO3 noticed a burning sensation in both eyes. After a medical exam, it was diagnosed as a chemical burn to both eyes.

More examples could be added to this list, but I think you get the idea. It took an injury before the people in these mishaps learned the value of wearing proper protective equipment. What will it take for you to learn?

OPNAVINST 5100.23B states: "Approved eye and face protection shall be worn when there is a reasonable probability that an injury can be prevented by wearing such equipment." Wearing proper eye protection during an aircraft wash seems to fit this requirement. So, what's your excuse?

ANSI Z87.1-1979, para.6.1.3.2.3, outlines the requirements for splash-proof goggles. NA 01-1A-509, Table B-1, item 71, lists acceptable splash-proof goggles. When ordering the goggles (NSN 4240-00-190-6432), mark the requisition chit with "No Substitutions." This will ensure you receive non-ventilated goggles.

There's a New Support Equipment Analyst at the Safety Center

By ASCM J. W. Paul

Hi, I'm ASCM Jerry Paul. I'm relieving ASCS Doug Koenker as the Support Equipment (SE) Analyst. I've just completed a tour as the SE division chief at AIMD, NAS Jacksonville, Fla. My experience in the Navy includes a wide variety of SE duties afloat, at a shipyard, in squadrons, in overseas billets, as an instructor and on shore assignments.

I'm looking forward to my tour here at the Naval Safety Center and will concentrate my efforts toward assisting you and the Navy in safety matters.

Please don't hesitate to write or call: Naval Safety Center, Naval Air Station, Norfolk, VA 23511-5796, Attn: Code 12; Autovon 564-6512, Commercial 804-444-6512.

The Shocking Truth

By Lt. C. Meuer, QAD V-2

Support Equipment is an integral part of every squadron's maintenance effort. Without reliable SE, it's difficult to get our job done. One part of making sure the yellow gear stays reliable is the pre-operational inspection. Not completing a proper "pre-op" almost cost one petty officer his life.

An MMG-1 was being used in the hangar when the petty officer standing firewatch attempted to move the cable off the control panel and was literally shocked! The unit was secured. Upon inspection, the 440-volt input cable showed signs of chaffing and cutting. The cable had pulled through the connector and shorted against the bulkhead. This in turn, caused the petty officer to be shocked while handling the cable.

Pre-ops are designed to identify discrepancies on support equipment to ensure proper operation. Not completing one increases the chances that you'll damage the equipment you are working on – or even yourself.

Could this incident have been prevented? In all likelihood, yes. Fortunately, this story had a happy ending. Train your people right. Make sure they do pre-ops.

Moving Aircraft or "If I'd Only Been Paying Attention"

By ASCM J.W. Paul

In the short time I've been assigned to the Naval Safety Center, I've read tons of message traffic that passes over my desk each day. It is clear that when it comes to moving aircraft, *we must be doing something wrong!* Almost every month I find a message about someone getting hurt or killed, or one about an aircraft or piece of support equipment getting crunched.

It takes six qualified personnel to move an aircraft safely, right? A director, a brake rider, a tractor driver, right and left wing observers and a tail observer. It seems to me that if everyone were paying attention to what they were doing and watching the director, accidents would never happen. Agreed? The main problem is getting everyone to pay attention.

Look mates, have you ever stopped and thought about what you're really doing and how important it is that you do it right? First, your life is priceless. If nothing else, you need to do it right to keep yourself safe and in one piece. Next is the aircraft. You're in charge of moving a multimillion dollar weapons system. The squadron and the Navy depend heavily on you to do it right. Think of the grief, cost and man-hours involved when it's not done right.

Everyone involved in moving an aircraft is responsible for making sure it gets done safely and correctly. What would it be like to go home without an arm, a leg or even an eye, and to live with that for the rest of your life? You'd be constantly haunted by the words, "If I'd only been paying attention."

AVIONICS

Shorting Out Common Sense

By ATC(AW) T.G. Grigsby

This regular feature is intended to trigger shop discussions on how to improve the various areas of aircraft maintenance. Faulty maintenance practices in avionics tend to be overlooked due to the spectacular nature of crashes caused by the failure of engines and flight control systems. In the fleet avionics shops, I have frequently found a somewhat casual attitude toward the NAMP safety programs and aircraft mishaps. Take a look at the following incidents and the possible cause factors, and ask your-

self, "Where was the missing supervision that could have broken the chain?"

● During a syllabus air-to-air ACM training mission, the F/A-18 pilot started a loop. Passing 30 degrees nose up, the aircraft departed controlled flight — inverted. Postflight analysis revealed that the leading edge flaps were programmed to 10 degrees instead of the normal 26 degrees required for this maneuver. Maintenance inspection revealed a pitot line disconnected at a pitot tube "T" in door 13R.

● A P-3C pilot and copilot noticed a significant split between their airspeed indicators, so they aborted the flight and dumped fuel. Maintenance discovered a pitot static line plugged by an insect nest. (This is why we have pitot port covers.)

● As an EA-6B was climbing through 11,000 feet, the starboard fire warning light illuminated. The aircrew performed NATOPS procedures, declared an emergency and made an arrested landing. The postflight inspection revealed the ceramic insulation on the fire-warning connector was damaged due to inadequate length of wire. Normal aircraft vibration caused the center conducted to short against the outside casing of the connector. Approximately 2 inches of wire was added to the harness, allowing more flexibility to compensate for aircraft vibrations.

● While engaged in a 1 vs 1 ACM flight, an A-4 pilot advanced power to military, then retarded the throttle. The throttle would not retard below 90 percent. The pilot made an uneventful, visual, stuck throttle approach. Postflight inspection revealed a cannon plug from the C4419/APN154(V) Radar Beacon Control Unit was not properly stowed in the throttle quadrant.

● During a launch, an A-6E trouble-shooter was standing on the pilot's boarding ladder while working on the cockpit AOA system. A bracket fell out of the trouble-shooter's pocket and was ingested. The engine duct inspection after shutdown revealed major nicks on the first- and second-stage blades.

● Using only a wire schematic, the electricians started to take voltage readings while trouble-shooting the EP-3E fire detection system. They inadvertently fired the APU fire extinguisher cartridge, releasing bromotrifluoromethane into the APU compartment. This could have injured or killed anyone working in the APU compartment at the time of firing. The electricians did not have a thorough knowledge of APU fire extinguisher operation and did not follow complete trouble-shooting procedures IAW with the MIMs.

In each instance, maintenance personnel and their supervisors failed to ensure standard maintenance practices were followed. All too often, maintenance supervisors are caught up in administrative tasks, and they fail to excercise their supervisory responsibilities required by the NAMP. According to the dictionary, supervision is "a critical watching and directing." With few exceptions, supervisors do not possess the "super" vision to oversee work on aircraft through steel bulkheads from the work center desk

LIFE SUPPORT EQUIPMENT

Slip-Shod Chute

By CWO4 W.R. Whiteaker, USMC

The following discrepancies were discovered recently on an "acceptance inspection" of an NES-12/M Parachute Assembly:

— Arming cable housing routed over, instead of under, the right riser.

— Container dry-rotted.

Both of these discrepancies are upsetting and easily preventable.

The proper routing for the arming cable housing is found in NA 13-1-6.2, W/P 72 00, page 11. If the manual is followed step-by-step, there is no possible way to trap the riser under the arming cable housing because the risers are installed after the automatic parachute release assembly. There are many pictures (illustrations for QA steps) that show the correct routing of the arming cable housing and riser throughout the remainder of the work package.

As for the dry-rotted container, there's simply not much to say. This particular parachute assembly is supposed to be inspected every seven days by a qualified PR. I cannot imagine a PR overlooking a dry-rotted container. Therefore, we must assume that an extremely fast-acting strain of dry rot attacked the container within seven days prior to the acceptance inspection.

Attention to detail, sound quality assurance procedures and a great deal of concern for human life should be staple ingredients for all maintenance actions, especially when they concern ALSS.

The fact that these discrepancies were discovered on an acceptance inspection is not surprising. It is all too easy for maintenance quality to slip a little

once an aircraft has been identified for transfer. An aircraft squadron may have numerous unit citations, awards and boast of an outstanding reputation throughout the fleet, however, nothing tells more about a unit than the material condition of the aircraft or equipment they transfer.

Assaulting Battery

By CWO4 W. R. Whiteaker, USMC

Take care when handling and installing batteries. A recent occurrence demonstrates how even small dry cells are potentially hazardous.

"During inspection and installation of new batteries in an SDU-30 Distress Signal Light, one of two batteries exploded upon insertion. The explosion sent the SDU-30 across the room approximately 15 feet, splattering battery electrolyte in its path."

The PR had been following the steps in the appropriate maintenance manual (NA 13-1-6.5). He was familiar with the caution concerning battery installation.

Batteries are relatively safe when handled correctly. However, occasionally a mishap will occur Your best defense against injury is to be prepared. Maintain a first aid kit in the work center. Ensure you have ready access to emergency eye wash equipment or an emergency shower. Perform periodic inspections on your emergency equipment. Don't wait till you need it to find out that the water to your eye wash station was secured because of a leak or that your first aid kit is just an empty box If the task at hand calls for protective clothing, make sure you wear it and that it's serviceable.

Cracked Mouthpiece

By W.R.Whiteaker,USMC

An LPU-21 B/P life preserver was inducted into AIMD for a "Place in Service Inspection." During packing procedures, the PR1 tried to secure the oral inflation valve by turning the knurled ring. The mouthpiece, spring and knurled ring separated from the plunger and housing. Further investigation revealed a small crack in the mouthpiece where the plunger attaches.

Two other incidents of defective oral inflation valves have been reported in the last month. Pay particular attention to oral inflation assemblies during "Place in Service Inspections" performed on LPUs manufactured by SWITLIK (FSCM 78673) under Contract No. N00383-86-C-9069.

Deadly Shortcuts

By AMEC(AW) S.M. Bonshak

When working on aircraft systems, we often feel pressured to take shortcuts in order to get the plane up to meet the squadron commitments. Such shortcuts can often be very hazardous or even **deadly**.

Recently, someone asked us if there is a shortcut for purging aircraft liquid oxygen (LOX) systems suspected of being contaminated. There is *no* short cut. The LOX system is one of the most hazardous systems in an aircraft. When you take shortcuts, you are working with just luck to sustain you. At one time or another, luck will run out. The only question is when and how many people will be injured or killed in the process.

When you go by the book and use approved, step by-step maintenance, you are not working on luck You are implementing proven maintenance and safety practices. **Always** use approved procedures, **they save lives.**

Equipment Upkeep

By AMEC(AW) S.M. Bonshak

It has come to my attention that more and more AMEs are not paying attention to the proper upkeep of seat slings and canopy slings. What is even more disturbing is that they do not know when these items need to be turned in to AIMD for load tests. Quite a few of the shops depend on the toolroom to let them know when their equipment is due. In some cases, shops have been found using non-RFI equipment.

Working with unsafe equipment is very dangerous because it can injure or kill people. All fabric sling straps must be marked with the "placed in service" date and are limited to a 24-month service life. All aircraft hoists, slings and restraints should be inspected monthly, qualified by the AIMD annually and have a Test/Inspection/Certification Tag attached. For further information, refer to NA 17-1-114.

The LPU-23B/P and LPU-21B/P Preservers are Improved

By NAVAIRDEVCEN Warminster, PA

In the past, two problems were experienced with the LPU-23B/P and LPU-21B/P life preservers. One, the waist casing was too small to fully cover the inflatable waist bladder, resulting in exposure of the waist bladder and breakage of the packing pin. Two, some preservers inadvertently opened in the collar area while being worn during routine flight duties.

The cause of these problems was traced back to shortening of the casing assembly during manufacture. An Engineering Change Proposal (ECP) was drawn up and approved. This led to Aircrew Systems Change No. 507. The change requires removing the entire defective casing and installing a new casing. The procedure takes about a half-hour to perform.

The use of a template was implemented to ensure each new casing was of proper size. To retrofit existing preservers, spares and for interim support, 9,500 new life preserver casings were procured. Supply support was initiated with the Defense Industrial Supply Center to make sure the necessary hardware (used to attach the casing to the flotation bladder) was readily available. The hardware needed to support this change is 12 rivet posts (Part No. MS27986-3B, NIIN No. 5325-00-281-4359) and 12 rivet caps (Part No. MS27986-4B, NIIN No. 5325-00-281-2553) for each preserver retrofitted.

For history card documentation, the superseding part number and the national stock number for the LPU23B/P are 68A73H1-104 and 4220-01-138-4329, respectively.

Points of contact at NAVAIRDEVCEN are Mr. F. Rageis, Code 603413, (Autovon 441-7223) and Mr. J. Meyers, Code 6034X, (Autovon 441-7015).

Cold-Blooded Murder

By AMEC(AW) S.M. Bonshak

While performing a 210-day, special acceptance inspection on the egress system of a TA-4 Skyhawk, a lance corporal noticed something wrong with the lower ejection-control handle. He stopped and sought help from his supervisor and another member of his shop.

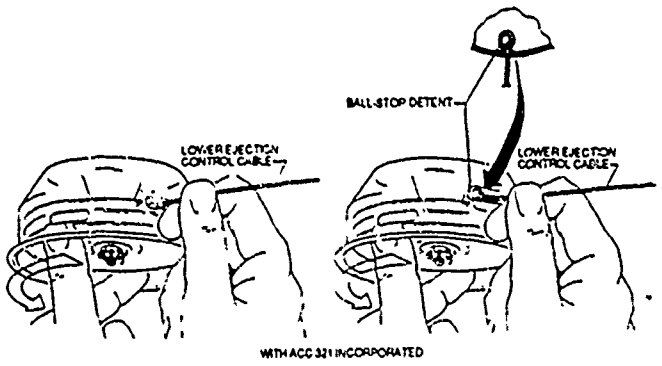
They found the lower ejection-control handle definitely stuck. After turning the seat up on its dolly, the supervisor found that the lower ejection-control disconnect cable was jammed or wedged within the disconnect pulley. It took a screwdriver and a hammer to free the cable from the pulley. Only 6 to 10 pounds pull force is normally required to move the cable. In this case, they estimated that it would have taken at least 250 pounds of pull force to activate the seat using the lower ejection-control handle. The 210-day Maintenance Requirement Card has a CAUTION that states: "Do not allow lower ejection-control handle disconnect pulley to spring back in free rotation, as kinking may occur at lower end of lower ejection-control cable."

Investigation revealed that after the last time the seat had been inspected and reinstalled, the aircraft had flown a couple of flights prior to flying a cross-country ferry flight. If at any time an emergency had arisen and the pilot had had to eject by

CARD 53 13		NAVAIR 01-40AVD-6-3 DATE 1 July 1988			CHANGE NO	SPECIAL 210 DAY	ELEC PWR NA
WORK ZONE	CRSN	TIME	RTG AME NO. 1	MOS 6062 NO. 1	IG-3 EJECTION SEAT		HYD PWR NA COND AIR NA
		(3) stow lower ejection handle in detent position and place ejection control safety handle in UP position (4) disengage lower ejection handle from detent, attach force gage to center of lower ejection handle and apply pull force of 6 - 10 pounds; handle must extend from stowed position maximum of 4-3/4 inches and firing control disconnect safety lockpin bottoms out in socket on top of seat CAUTION: Do not allow lower ejection control handle disconnect pulley to spring back in free rotation as kinking may occur at lower end of lower ejection control cable f. pull down on firing control disconnect cable and continue pulling lower ejection control handle, handle and cable must disengage from seat. g. lower ejection control handle for damage and distortion cable lockpins and hinge lockpins for installation and security. C h. lower ejection control handle cable for kinks, corrosion, and fraying; cable end fitting for damage and security Continued					

CARD 53 14		NAVAIR 01-40AVD 6-3 DATE 1 July 1988			CHANGE NO	SPECIAL 210 DAY	ELEC PWR NA
WORK ZONE	CRSN	TIME	RTG AME NO 1	MOS 6062 NO 1	IG-3 EJECTION SEAT		HYD PWR NA COND AIR NA
		NOTE: Assure handle snaps into detent position i. insert lower ejection control handle cable through handle recess hole in center of forward beam of seat and stow handle into detent position C j. lower ejection control disconnect pulley assembly for cracks corrosion and distortion pulley ball stop detents for cracks and burrs NOTE: A bend is allowed in cable end due to installation procedure with ACC 321 incorporated (No kinks allowed) C k. lower ejection control cable assembly between disconnect pulley assembly and firing control disconnect assembly for proper routing in accordance with NAVAIR 01-40AVD-2-2-4 damage and corrosion, visible cable for kinks and fraying, end fittings for damage and security l. rotate disconnect pulley counterclockwise viewed from bottom, until spring force is felt m. rotate pulley up to 90 degrees in either direction until ball stop detent appears in upper slot of disconnect pulley housing, see illustration Continued					

CARD 53.16	NAVAIR 01-40AVD-6-3 DATE 1 July 1988	CHANGE NO.	LOWER EJECTION CONTROL CABLE



Continued

CARD 53.17	NAVAIR 01-40AVD 6-3 DATE 1 July 1988	CHANGE NO.	SPECIAL 210 DAY	ELEC PWR
WORK ZONE	CREW STATION TIME	RTG AME NO. 1 / MOS 6062 NO. 1	IG-3 EJECTION SEAT	HYD PWR N COND AIR N

u. remove lower ejection control handle from stowed position and pull handle securing fining control disconnect safety lockpin bottoms out in socket on top of seat; control cable must not disengage from seat and cables must be retained in fining control disconnect assembly
v. reset fining rods on back of seat.
w. place ejection control safety handle in DOWN position
x. attach force gage to center of lower ejection control handle and pull straight up to limit of travel. continue pulling, applying 30 pounds of force. handle and cable assembly must not disengage from seat

NOTE Assure handle snaps into detent position

y. stow lower ejection control handle into detent position on seat

Continued

using the lower ejection-control handle, nothing would have happened, or the seat would have only partially worked. In either case, the pilot and copilot could have died. That degree of maintenance malpractice is Cold-Blooded Murder. When you are performing maintenance on emergency or survival equipment, do it as if you are going flying with that equipment and your survival will depend on your work.

An outstanding job by SSgt. Shirley and his crew for identifying a dangerous situation and eliminating it. Keep up the good work.

Having Your Head Up and Locked

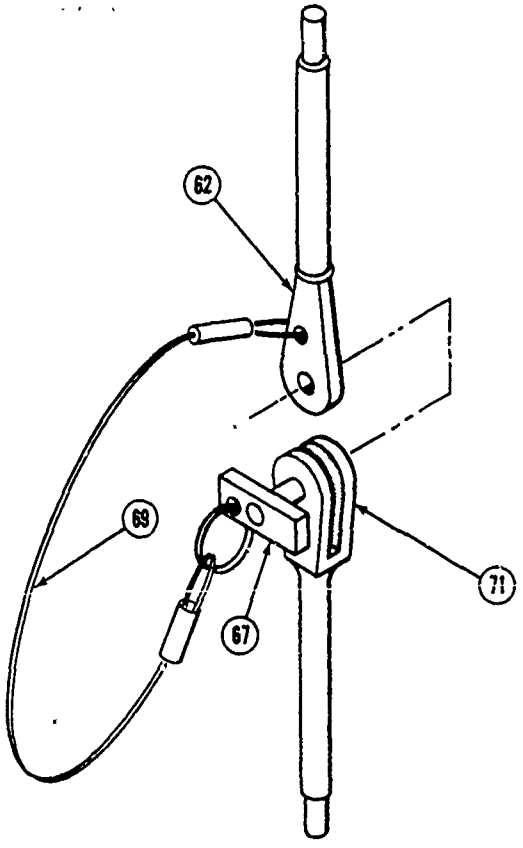
By AMEC(AW) S. M. Bonshak

Ocassionally people do stupid things, and most of the time no one gets hurt. However, when someone is performing maintenance on ejection seats, stupidity can injure or kill.

Recently in an A-6 squadron, five Marines were preparing to install ejection seats in an aircraft in the hangar bay. First, the crew had to assemble the crane: lock the wheels, spread the legs and raise the mast assembly. Once the forward boom was raised, they installed the quick-release locking-pin through the base attach point that holds the forward boom in the highest position. The crew attached the pilot's ejection seat to the crane and began hoisting the seat off the seat dolly. When the seat was about 18 inches off the dolly, the boom collapsed and landed on a crew member's right hand, fracturing his third and fourth fingers.

Inspection of the crane after the mishap revealed that the quick-release locking-pin (No. 67 on accompanying diagram) was installed through the base attach point (No. 71) but was not inserted through the loose end of the long positioning cable (No. 62). The crane appeared to be set up properly, but the forward boom was only secured by the pin retainer cable (No. 69) that retains the quick-release locking-pin with the end of the long positioning cable. When the ejection seat was raised off the dolly, the pin retainer cable broke and the forward boom dropped.

This crew was lucky. The incident could have been a lot worse. The lessons learned once again are: always double-check equipment before using it; make sure it is properly set up and in good working condition.



AIRFRAMES

The Right Stuff

By AMCS(AW) R.C. Novak

Who has the right stuff? We all do, and in the coming months, I hope to be able to prove it to all my shipmates. You see, I'm the new guy on the block, and I want to hear from the people in the fleet. You can call me, send me a letter or visit in person. I want to know what's concerning you in the trenches. Give me your inputs. The right stuff isn't only what I consider to be important, but what you feel is important also.

Of course, achieving such understanding takes one thing which, at times, is hard to come by: good communications.

So, let's not hesitate to communicate. Send me your questions; give me your advice and thoughts on safety articles. Tell me what you see as fleet problem areas I should address. To the men and women of the Navy and Marine Corps, I look forward to working with you in making our activities safer places to work.

Freon — It's That Time Again

By AMCS(AW) R. C. Novak

Well here I am, freshly qualified to do hydraulic contamination analysis. Now, what was it my supervisor said? Oh yes, "MIL-C-81302, Freon, is the preferred solvent to use." We have five gallons of it in the storage locker, and AN Jones is using some of it to clean a hydraulic servo-cylinder. Does this scenario sound familiar? I hope not.

Freon, a chlorinated solvent, is *not* an authorized aircraft cleaner nor a hydraulic component cleaner.

Freon *is* the authorized cleaner for avionics gear (per NAVAIR 16-1-540), and *is also* authorized for cleaning and flushing the following systems and equipment:

- Air conditioning and refrigeration equipment
- Oxygen and nitrogen systems
- Electrical generators and motor generator sets
- Wherever current Navy technical instructions do not allow an alternative, i.e., MIMs and MRCs.

When MIL-C-81302 is not available, MIL-T-81533 or P-D-680 may be used *only if* applicable technical instructions or MRCs authorize the two substitutes to be used. Because of their toxicity and flammability, use caution when working with any solvents.

Recent EIs on failed hydraulic components show evidence of hydraulic fluid contamination from chlorinated solvents. This means we have to re-educate our people in the proper uses of Freon before a failure leads to an "Aircraft Mishap Site."

Huck Gun Blows Up

By GySgt P. Holcomb

We recently received a Material Deficiency Report (MDR) submitted by the 347TFW, Moody AFB, Ga., on the Huck Rivet Gun, Model 227. The gun failed while being used with 100 psi air pressure and pulling a 5/32 Cherry Max rivet. After the operator pulled the trigger and while the gun was cycling through its pulling phase – **the bottom base blew off!** The piston came out of the gun, hit a wall and bounced off, landing 80 feet away.

The gun was new, a Huck Manufacturing Company Model 227 (Ser/Lot Batch Number 0000002064). Moody AFB personnel have two other guns known to be bad and, pending the results of an investigation, have pulled this model out of service.

A review of NAVMATSO records indicates that the Navy and Marine Corps have not reported similar problems with this Huck rivet gun. If you have any Huck guns with this 227 Model number, check the owner's manual for proper operation. Use carefully and report any malfunctions.

Selecting and Substituting Rivets

By Lee C. Rogers
NAESU Det New River, NC

When you repair the primary structure of an aircraft, maintaining the structural strength depends on several factors. Primarily, it depends on the materials and the strength of the rivets used to attach the materials.

You may not be able to substitute one rivet for another where the primary structure is heavily loaded in both shear and tension. Of particular concern are those common, solid-shank rivets used in most aircraft applications. If you use those rivets, you should get familiar with the Structural Hardware Manual, NAVAIR 01-1A-8, page 1-27, table 1-20, which provides information on the single- and double-shear factors of aluminum alloy rivets.

In the repair of primary structures, you may encounter solid-shank rivets in the original manufacture, i.e., 2017-T4 (D) or the 2024-T4 (DD) rivets, which are of greater strength than the common 2117-T45 aluminum alloy rivet. Refer to table 3-5 and note distinct, individual head markings and characteristics.

Whenever you find either the (D) or (DD) rivet in the original manufacture, you should replace those rivets with the original type. However, before the (D) OR (DD) rivets can be driven, a preliminary heat-treat process must be performed, followed by refrigeration if the rivets are not installed immediately. Do not attempt to drive these rivets unless the (D) and (DD) rivets are annealed by a heat-treat process outlined in the Structural Hardware Manual.

Under unusual conditions, i.e., a forward zone where heat-treat capabilities are not available or practical, you can replace or substitute for the (D) or (DD) rivet by using a 2117-T4 rivet one diameter larger than the original.

Where the aluminum alloy rivet, 2117-T4 (AD), is used exclusively in the original manufacturer, there will be few problems as this particular rivet can be installed "as received" from supply.

Wherever diameter tolerances of the rivet hole are exceeded, consult the interchangeability hardware data charts for possible substitutions using AN/NAS bolt and nut applications or various Hilock or Huck bolt fasteners.

The structural repair manual for your aircraft should be consulted first. If it doesn't contain listings of suitable fastener substitutes, then use the procedures outlined in this article. — Ed.

TABLE 3-5. Rivet Identification and Characteristics

Rivet Head Marking	Physical Characteristics	Material	Classification or Specification
Indented		Steel, Carbon	QQ-S 630 631 634 637
Raised or Indented Revised to Δ	Hardness Maximum – Rockwell B60 or equal	Steel	AMS7225
Indented Dash	Shear Strength, 45,000 to 55,000 PSI Hardness: Maximum – Rockwell B60 or equal	Steel, Corr Res	QQ W-423, FS302 or 304 Composition
Raised or Indented Mark "H1" only on 062 Rivets		Steel, Heat & Corr Res	AMS7229 (18 Cr-11 N)
Raised or Indented Mark "H2" only on 062 Rivets		Steel, Heat & Corr Res	AMS7232
Indented		Nickel Steel	QQ S-624, FS2317
Projected Cross	Tensile Strength 53,000 – 68 000 PSI-Heat Treat	Steel, Medium	MIL-R-1223A
Plain	No shear test required	Aluminum Alloy 1100-F(A)	MIL-R-5674 QQ-A-430 MIL-H-6088
Indented Dimple	Shear Strength of Driven Rivet – 26 000 PSI	Aluminum Alloy 2117-T4(AD)	MIL-R-5674 QQ A-430 MIL-H-6088
Raised Teat	Shear Strength of Driven Rivet – 33,000 PSI	Aluminum Alloy 2017-T4(D)	MIL-R-5674 QQ-A-430 MIL-H 6088
Raised Double Dash	Shear Strength of Driven Rivet – 37,000 PSI	Aluminum Alloy 2024-T4(DD)	MIL-R-5674 QQ A-430 MIL-H-6088
(1) Indented, Blind Explosive (2) Raised, Solid	Shear Strenth of Driven Rivet – 24,000 PSI	Aluminum Alloy 5056-H32(B)	MIL-R-5674 QQ A-430 MIL-H-6088
Projected Flutes	Tensile Strength, 64,000 – 83 000 PSI Yield Point 38 000 Heat Treat, Shear Strength Min 64 000 PSI	Steel Grade HT	MIL-R-1223A

ARMAMENT

EMR Reports

By AOCM Tom Light

The Naval Safety Center's goal is to provide essential information needed to prevent mishaps caused by poor design, training deficiencies or other factors.

The Explosives and Weapons Division (Code 43) receives EMRs (Explosive Mishap Reports) and ordnance-related accident and incident information which we enter into our permanent computer file. We use this information to conduct trend analysis and prepare other reports. This information base provides historical data for commands throughout the Navy and Marine Corps.

Sounds simple, doesn't it? It could be, but the reports we prepare are only as good as the information we receive. Many reports contain errors. I've prepared

an example out of OPNAVINST 4790.2E, Volume II, page 5-31 and highlighted places on this report that people usually fill out incorrectly.

Line item 1 (*UIC*) unit identification code. This is a five-digit alpha-numeric code that identifies the *unit* sending the report.

Line item 20 (*WUC*) work unit code. This is an alpha-numeric code that identifies the *item* being reported.

Line item 22, subject line H, item 3, (*NALC*) Navy Ammunition Logistics code. This is a four-digit alpha-numeric code that identifies the *ordnance* being reported. As you read the line across, the first thing you see is the item being reported, next is the serial number, followed by the DODIC – which is the same as a NALC.

If the UIC, the NALC or the WUC are not reported correctly, the computer input could be erroneous. So, we check the report.

Often, when we call the point-of-contact listed in the EMR, we find that the person listed doesn't know anything about the information reported. This indicates to us that he or she *didn't* submit the report.

If you're not sure how or when to submit an EMR or you don't know what form to use – don't guess! Ask questions or call us on Autovon 564-3342/43. Our commercial number is 804-444-3342/43.

FROM FITRON SEVEN ONE
TO COMPACMISTESTCEN PT MUGU CA
AIG FOUR TWO THREE
AIG SEVEN SIX TWO ZERO
INFO COMTACWINGSLANT OCEANA VA
COMCARAIRWING EIGHT
USS FRANKLIN
UNCLAS //N04790//
SUBJ. EXPLOSIVE MISHAP REPORT
A. OPNAVINST 4790.2E
B. OPNAVINST 5102.1B
1. VF-71/34567
2. PACMISTESTCEN PT MUGU CA
3. R34567-88-0040
4. 7365/DEPLOYED
5. BE 1410-01-056-9405
6. AIM 9L TACTICAL GUIDED MISSILE
7. 49956
8. N/A
9. SER. NO. KRE-0235
10. UNK
11. REWORKED
12. 20 APRIL 86
13 137.9 HRS
14. N/A
15. N/A
16. F-14A
17. 58,000/UNK
18. N/A
19. UNK
20. 75M12
21. HOLDING 30 DAYS AT WEAPONS DEPT USS FRANKLIN (CV-58).
22. A. ARMING DEVICE WILL NOT STAY IN ARMED POSITION GOES TO SAFE IN FLIGHT.
B. POSSIBLE LOSS OF MISSION CAPABILITY.
C. TWO IN LAST SIX MONTHS.
D VISUAL ON AIRCRAFT RECOVERY.
E. THROUGH G. N/A
H. (1) NONE
(2) VISIBILITY 5 MILES AND SCATTERED/WIND 9 KNTS/TEMP 76 DEG F
(3) AGM- L TACTICAL GUIDED MISSILE/SER. NO. KRE-0235/DODIC PA72/BE 1410-01-056-9405.
(4) LAU-7/A-5 SER NO.0032/AIRCRAFT STA.1A.
(5) N/A
(6) 52
(7) SAFE/ARM SWITCH OF ARMING DEVICE WILL NOT STAY IN ARMED POSITION WHILE IN FLIGHT.
(8) THROUGH (15) N/A
(16) AIM 9L LOADED ON AIRCRAFT STA. 1A AND 8A.
I. AOC B.B. STACKER/ARMAMENT BRANCH CPO/DEPLOYED
J. F-14A/161162
K. N/A

Figure 5-31 Sample Explosive Mishap Report (EMR)

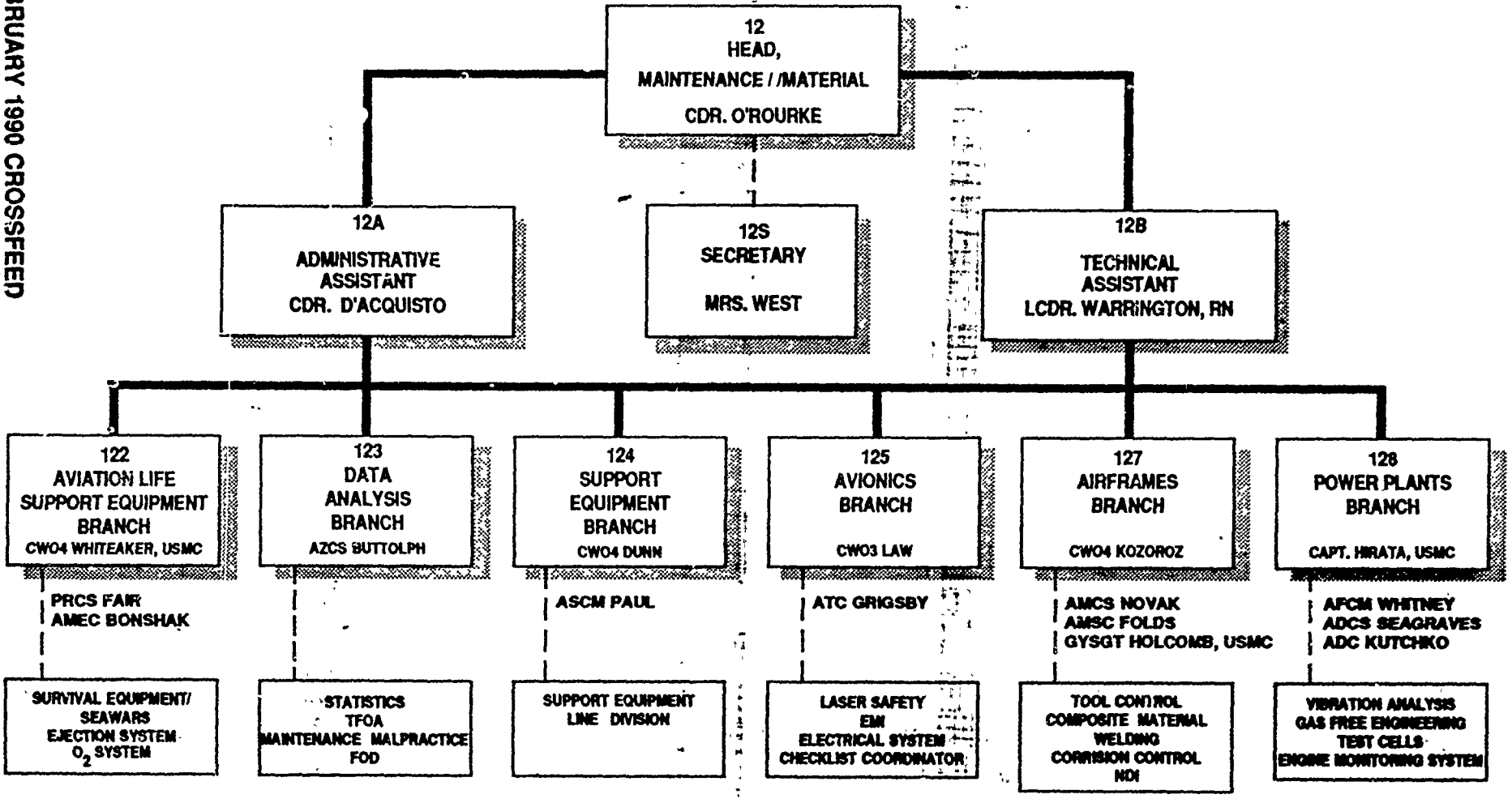
Explosive Mishap Breakdown for Sept and Oct 1989

Type of Mishap

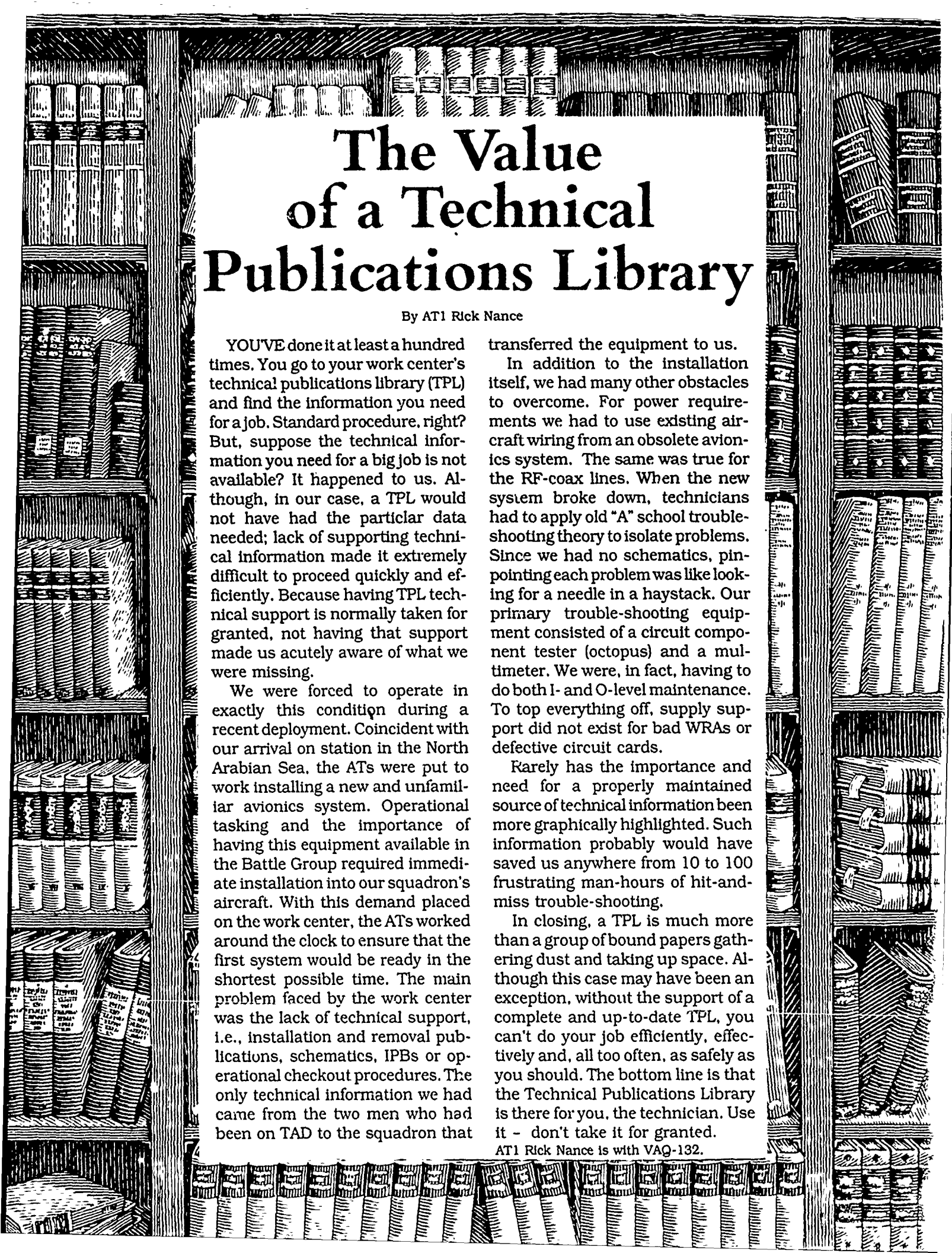
Type Activity	Detonation	Malfunction	Fail to Test	Observed Defect	Other	Total
Aviation	55	46	25	245	1	372
Shore	8	3	1	17	1	30
Submarine	0	0	0	2	1	3
Surface	1	18	2	23	2	46
Total	64	67	28	287	5	451

Loss			**Cause**			
Type Activity	Deaths	Injuries	Personnel	Material	Design	Other
Aviation	1	3	36	19	0	317
Surface	0	9	15	6	0	9
Shore	0	0	2	0	0	1
Submarine	1	4	7	18	0	21
Total	2	16	60	43	0	348

Naval Safety Center
Maintenance/Material Division



Telephone Numbers: Autovon 564-3494 ● Commercial 804-444-3494



The Value of a Technical Publications Library

By AT1 Rick Nance

YOU'VE done it at least a hundred times. You go to your work center's technical publications library (TPL) and find the information you need for a job. Standard procedure, right? But, suppose the technical information you need for a big job is not available? It happened to us. Although, in our case, a TPL would not have had the particlar data needed; lack of supporting technical information made it extremely difficult to proceed quickly and efficiently. Because having TPL technical support is normally taken for granted, not having that support made us acutely aware of what we were missing.

We were forced to operate in exactly this condition during a recent deployment. Coincident with our arrival on station in the North Arabian Sea, the ATs were put to work installing a new and unfamiliar avionics system. Operational tasking and the importance of having this equipment available in the Battle Group required immediate installation into our squadron's aircraft. With this demand placed on the work center, the ATs worked around the clock to ensure that the first system would be ready in the shortest possible time. The main problem faced by the work center was the lack of technical support, i.e., installation and removal publications, schematics, IPBs or operational checkout procedures. The only technical information we had came from the two men who had been on TAD to the squadron that transferred the equipment to us.

In addition to the installation itself, we had many other obstacles to overcome. For power requirements we had to use existing aircraft wiring from an obsolete avionics system. The same was true for the RF-coax lines. When the new system broke down, technicians had to apply old "A" school trouble-shooting theory to isolate problems. Since we had no schematics, pinpointing each problem was like looking for a needle in a haystack. Our primary trouble-shooting equipment consisted of a circuit component tester (octopus) and a multimeter. We were, in fact, having to do both I- and O-level maintenance. To top everything off, supply support did not exist for bad WRAs or defective circuit cards.

Rarely has the importance and need for a properly maintained source of technical information been more graphically highlighted. Such information probably would have saved us anywhere from 10 to 100 frustrating man-hours of hit-and-miss trouble-shooting.

In closing, a TPL is much more than a group of bound papers gathering dust and taking up space. Although this case may have been an exception, without the support of a complete and up-to-date TPL, you can't do your job efficiently, effectively and, all too often, as safely as you should. The bottom line is that the Technical Publications Library is there for you, the technician. Use it - don't take it for granted.

AT1 Rick Nance is with VAQ-132.

The Devil's Advocate

Series Presents CY 1987 through Sept '89 Maintenance Errors, With Trends and Forecasts for 1990

By Fred Patterson and Russ Marcoux

THIS series, compiled from two years and nine months of statistics, gives you the chance to note how well your aircraft community is doing. It highlights the specific maintenance areas where remedial attention is required.

In Table No. 1, check the component failings listed under your model aircraft. Then, determine how your people apply the procedures listed in the MIMs or on the MRCs. Make sure you correct any deviations found. By eliminating procedural mistakes or weaknesses in the execution of maintenance actions, the personnel factor is removed, leaving only component failures as maintenance mishap causes.

Table No. 2 compares the total numbe. of flight, flight-related and ground mishaps and rate by major commands (for the first nine months of CY 1989) to the maintenance-caused number and percentage of total mishaps. The rate for maintenance-caused mishaps can be calculated by multiplying the percentage against the

total rate.

Table No. 3 presents maintenance personnel errors reported through 30 September 1989 by aircraft model. It also gives your community an idea of how it is doing compared to the original 1989 forecast made in the Jan/Feb '89 issue.

Table No. 4 is a forecast, by type aircraft of the number of maintenance personnel errors to expect during CY 1990. These stats are based on the inputs made to our computers for the period 1987 through September 1989.

Table No. 5 lists maintenance personnel error forecast for 1990 by *mishap classification*, while the forecast presented in Table No. 6 is by *problem area*.

Check all forecast tables to see where your activity can improve and prove the forecasts wrong. This is the fourth year of this series, and every year most of the forecasts have proven to be too high. The most logical explanation is that a good many of you, after reading what we present in this Devil's Advocate series, reacted by improving the way you conduct maintenance. Positive feedback from our previous Devil's Advocate presentations prompts us to again urge you to challenge the forecasts and come out winners.

You done good - just keep it up.

Table No. 1
Number of Component Occurrences
In Class A/B/C Flight Mishaps
Involving Maintenance Personnel Errors
CY 1987 through 9/89

Note: The counts of failures given do not necessarily refer to separate mishaps since one mishap may have several problems.

Aircraft		Count
F-14	**Maintenance error mishaps**	4
	Airframe:	
	Wing structure	1
	Engine duct bellmouth	1
	Loss of equipment from aircraft	1
	Out of track, balance or alignment	1
	Flight controls:	
	Hydraulic systems module	1
	Unusual or erratic control signals or maneuvers	1
	Hydraulic/pneumatic system:	
	Seals or packing failed	1
	Leakage	1
	Overheated components	1
	Multiple systems failure	1
	Instrument systems:	
	Angle of attack indicator	1
	Interference or binding	1
	Intermittent operation, fluctuation or surging	1
	False indication	1
	Catapult and arresting gear systems:	
	Arresting gear	1
	Cracks, breaks or buckling	1
	Improper use of safety locking device	1
	Power plantu:	
	Compressor stall	1
F/A-18	**Maintenance error mishaps**	5
	Controls:	
	Stabilator, varicam actuators and servos	1
	Murphy	1
	Unusual or erratic control signals or maneuvers	1
	Fuel system:	
	Murphy	1
	Leakage	2
	Landing gear system:	
	Main landing gear linkages	1
	Nose landing gear wiring	1
	Cracks, breaks or buckling	1
	Changes, bulletins or instructions not incorporated	1
	Landing gear not extended, retracted or excessively stressed	1
	Power plants:	
	Afterburner fuel spray bars	1
	Throttle control system	1
	Cracks, breaks or buckling	1

Aircraft		Count
F/A-18	Changes, bulletins or instructions not incorporated	1
	FOD	1
	Landing with engine(s) secured	1
	Intermittent operation, fluctuation or surging	1
	Compressor stall	1
	Precautionary securing of engine	1
A-4	**Maintenance error mishaps**	2
(less	With lack of training a known factor	1
TA-4)	**Flight controls:**	
	Unusual or erratic control signals or maneuvers	1
	Electrical or electronics:	
	AC power system generator inverter	1
	Loss of AC power	1
	Fuel system:	
	Engine fuel supply system cap or receptacle	1
	Instrument system:	
	Fire warning indicator	1
	Air conditioning and pressurization systems:	
	Smoke, fumes or odors in aircraft	1
TA-4	**Maintenance error mishaps**	4
	Airframe:	
	Canopy	1
	Brakes:	
	Brake pucks	1
	Actuating system plumbing	1
	Leakage	1
	Worn or frayed	1
	Improper pressure	1
	Improper use of safety locking device	1
	Hydraulic or pneumatic systems:	
	Leakage	1
	Landing gear system:	
	Nose landing gear strut	1
	Cracks, breaks or buckling	1
	Interference or binding	1
	Power plants:	
	Lube system oil scavenge pump	1
	Main fuel pump	1
	Changes, bulletins or instructions not incorporated	1
	Excessive vibration	1
	Interference or binding	1
	Intermittent operation, fluctuation or surging	1
	Engine seizure	1
	Overspeed or underspeed	1
	Excessive oil consumption	1
	Improper maintenance	2
	Complete power loss (other than pilot induced)	1
A-6	**Maintenance error mishaps**	10
(less	**Airframe:**	
EA-6)	Engine access door or clamshell door	5
	Canopy latching, release or actuating mechanism	1
	Cracks, breaks or buckling	2
	Changes, bulletins or instructions not incorporated	1
	Excessive vibration	1
	Excessive wear	1
	Loss of equipment from aircraft	6
	Flight controls:	
	Wing leading edge	1
	Hydraulic systems plumbing	1
	Escape/survival:	
	Canopy jettison system actuator	1

Aircraft		Count
A-6	**Fuel system:**	
(less	Tanker package or buddy store electrical components	1
EA-6)	Engine fuel supply system probe	1
	Changes, bulletins or instructions not incorporated	1
	In-flight refueling failure, malfunction or overpressurization	1
	Fueling failure, malfunction or overpressurization	1
	Hydraulic/pneumatic system:	
	Cracks, breaks or buckling	1
	Utility system failure	1
	Flight system failure	1
	Landing gear system:	
	Main landing gear emergency gear extension	1
	Landing gear not extended or retracted	2
	Out of track, balance or alignment	1
	Power plant:	
	Turbine section casing	1
	Cracks, breaks or buckling	1
	Improper machining, casting, forging, welding, plating or coating	1
	FOD	1
	Landing with engines secured or at reduced power	1
	Compressor stall	1
	Fuel ingestion	1
	Complete power loss (pilot induced)	1
A-7	**Maintenance error mishaps**	3
	With lack of experience a known factor	1
	With lack of training a known factor	0
	Flight controls:	
	Rudder and rudder trimmer actuators or servos	1
	Murphy	1
	Unusual control signals/maneuvers	1
	Improper use of safety locking device	1
	Fuel system:	
	Under torque	1
	Fuel exhaustion or starvation	2
	Landing gear system:	
	Nose landing gear down lock	1
	Landing gear not extended or retracted	1
	Landing gear jammed in wheel well	1
	Power plant:	
	Engine fuel system main fuel pump	1
	Engine fuel system (excluding fuel control) not elsewhere coded	1
	Pilot induced flameout unintentionally	1
	Improper maintenance	1
	Complete power loss (other than pilot induced)	1
AV-8	**Maintenance error mishaps**	1
	With lack of experience or training a known factor	0
	Power plant:	
	Fuel pump drive	1
	Changes, bulletins, or instructions not incorporated	1
	Under torque	1
	Single-engine flameout	1
	Improper maintenance	1
	Complete power loss (other than pilot induced)	1

Aircraft		Count
EA-6B	**Maintenance error mishaps**	1
	Instrument systems:	
	Fire warning indicator	1
	Air conditioning and pressurization system:	
	Combustion heater system (not elsewhere coded)	1
	Pressurization and refrigeration systems expansion turbine air multiplier	1
	Cracks, breaks or buckling	1
	Overheated components	1
	Smoke, fumes or odors in aircraft.	1
E-2	**Maintenance error mishaps**	2
	Airframes:	
	Excessive vibration	1
	Loss of equipment from aircraft	1
	Electrical/electronics:	
	Communications system antennae	1
	Cracks, breaks or buckling	1
	Landing gear system:	
	Main landing gear strut	1
	Main landing gear drag linkage	1
	Cracks, breaks or buckling	1
	Cracks, breaks or buckling	1
	Changes, bulletins, instructions inadequate or in error	1
	Propeller system:	
	Blades (not elsewhere coded)	1
	Cracks, breaks or buckling	1
P-3	**Maintenance error mishaps**	1
	Electrical/electronics:	
	ASW system antennae	1
	Cracks, breaks or buckling	1
S-3	**Maintenance error mishaps**	1
	Power plant:	
	Combustion section liner	1
	Fuel starvation (fuel not being delivered to engine)	1
	Engine oil pressure loss	1
	Improper maintenance	1
T-2	**Maintenance error mishaps**	2
	Airframes:	
	Cracks, breaks or buckling	1
	Loss of equipment from aircraft	1
	Arresting/catapult system:	
	Cracks, breaks or buckling	1
	Landing gear system:	
	Main landing gear strut	1
	Main landing gear wheels	1
	Nose landing gear actuator	1
	Nose landing gear downlock	1
	Cracks, breaks or buckling	1
	Excessively stressed	1
	Bearing failure	1
	Incorrect part received or installed	1
	Power plant:	
	Foreign object damage	1
H-1	**Maintenance error mishaps**	1
	Instrument systems:	
	Fire warning light	1
	Power plant system, turbo shaft:	
	Fuel control or regulator	1
	Double-engine flameout	1
	Improper maintenance	1
H-2	**Maintenance error mishaps**	1

Aircraft		Count
H-2	**Airframe:**	
	Doors, hatches or sliding windows structure	1
	Loss of equipment from aircraft	1
H-3	**Maintenance error mishaps**	5
	Airframe:	
	No minor breakdown	1
	Cracks, breaks or buckling	1
	Structural failure	1
	Fuel system:	
	Engine fuel supply system: valve, flow limiter or regulator	1
	Leakage	1
	Instrument systems:	
	Automatic pilot or stabilization	1
	Power plant system, turbo shaft:	
	Accessory drive section	1
	Undetermined	1
	Contamination	1
	Landing with engines secured or reduced power	1
	Compressor stall	1
	Single-engine flameout	1
	Improper maintenance	3
	Complete power loss (other than pilot induced)	2
	Helo power train and main rotor system:	
	Main transmission, gear box lube pump and strainers	1
	Main transmission, gear box free wheeling unit	1
	Main transmission, gear box actuator	1
	Chafing	1
	Improper machining, casting, forging, welding, plating or coating	1
	Transmission or gearbox oil pressure loss	1
	Bearing failure	1
H-46	**Maintenance error mishaps**	6
	With lack training a known factor	2
	Airframe:	
	Transmission access door	1
	Wing structure	1
	Cracks, breaks or buckling	1
	Changes, bulletins, instructions inadequate or in error	1
	Fatigue	1
	Loss of equipment from aircraft	2
	Electrical or electronics:	
	AC power system solenoid or relay	1
	Murphy	1
	Fuel system:	
	Engine fuel supply system no minor breakdown	1
	Contamination	1
	Hydraulic/pneumatic system:	
	Leakage	1
	Interference/binding	1
	Instrument systems:	
	False or erratic instrument indication	1
	Power plant system, turbo shaft:	
	Fuel control regulator: no minor breakdown	1
	Engine electrical system:	
	Engine condition actuator	1
	Undetermined	1
	Previously reported discrepancy not co rected	1
	'Overtemp or undertemp	1

Aircraft		Count
	Oil pressure loss	1
	Control flow characteristics out of limits	1
	Double-engine flameout	1
	Improper maintenance	1
	Complete power loss (other than pilot induced)	1
	Helo power train and main rotor system:	
	Main rotor link assembly	1
	Cracks, breaks or buckling	1
H-53	**Maintenance error mishaps**	**3**
	Fuel systems:	
	Fuel not transferring	1
	Instrument systems:	
	Fuel quantity indicator	1
	Changes, bulletins and instructions inadequate or in error	1
	Previously reported discrepancy not corrected	1
	Power plant system, turbo shaft:	
	Main #4 bearing	1
	Undetermined	1
	Cracks, breaks or buckling	1
	Bearing failure	1
	Landing with engines secured or at reduced power	1
	Chip detector indication	1
	Improper maintenance	2
	Complete power loss (pilot induced)	1
H-60	**Maintenance error mishaps**	**2**
	Airframe:	
	Wing structure	1
	Cracks, breaks or buckling	1
	Controls:	
	Tail rotor control system structure	1
	Tail rotor blades	1
	Cracks, breaks or buckling	1
	Changes, bulletins and instructions inadequate	1
	Gunnery or ordnance system:	
	Torpedoes	1
	Interference or binding	1
	Aircraft struck by projectile, rocket, bomb, blast or external stores	1
	Hazardous or potentially dangerous condition	1

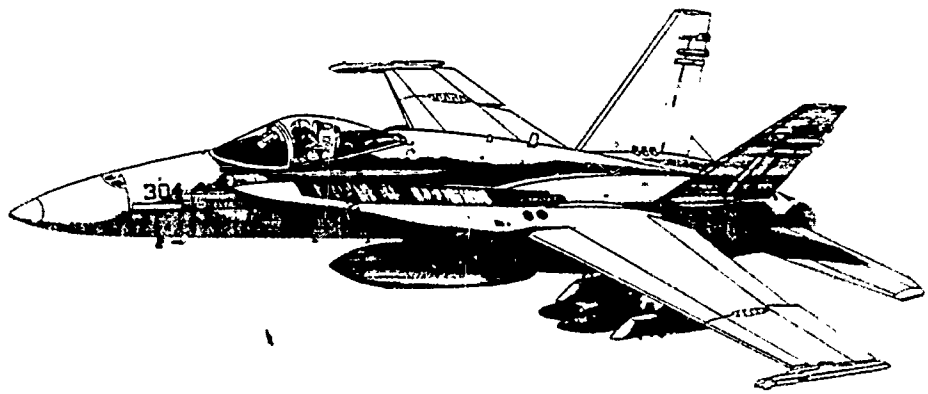


Table No. 2

CY 1989 Class A, B and C Flight/Flight-related and Ground Mishap Statistics:
Total versus Maintenance Personnel Errors (Through Sep '89)

	Total				Maintenance			
	Flt Mhps	FR Mhps	Grnd Mhps	(F+FR+G) *Rate	Flt Mhps	FR Mhps	Grnd Mhps	% of all Mhps
NAVAIRLANT	28	4	17	12.98	0	1	5	12.24
NAVAIRPAC	36	4	16	14.12	6	1	10	30.36
FMFLANT	14	3	8	22.57	1	1	3	20.00
FMFPAC	12	3	9	14.12	0	1	4	20.83
Non-FMF	0	0	1	5.52	0	0	1	100.00
4th MAW	4	0	2	13.22	0	0	1	16.67
NAVRES	8	0	2	7.00	0	0	1	10.00
CNATRA	23	0	6	7.24	3	0	1	13.79
NAVAIRSYSCOM	4	0	2	17.15	0	0	1	16.67
Total	129	14	63	12.14	10	4	27	19.90

(*Rate= number of mishaps per 100,000 flight hours.)

Table No. 3
Maintenance Personnel Errors
CY 1989 Class A, B and C Mishaps (F+FR+G)

	(Forecast for '89)	(Through Sep '89)
F-14	5	5
F/A-18	6	5
A-6 (EA-6)	8	5
H-46	5	5
H-3	3	5
H-53	6	4
T-2	0	2
A-7	1	2
H-2	1	1
E-2	3	1
T-39	1	1
P-3	4	1
H-60	3	1
T-34	1	1
TA-4	2	1
AV-8	1	1
EA-6B	4	0
F-4	2	0
H-1	2	0
S-3	1	0
C-130	1	0
A-4	1	0
C-12	0	0
Total	61	41

Table No. 4
Calendar Year 1990
Maintenance Personnel
Error Forecast By Type Aircraft
Class A, B and C
Mishaps (F+FR+G)

A-6 (-EA-6)	8
H-46	6
F/A-18	6
H-53	6
F-14	5
H-3	4
EA-6B	3
E-2	2
H-60	2
TA-4	2
A-7	2
P-3	2
T-2	2
C-130	1
AV-8	1
T-34	1
F-4	1
H-1	1
S-3	1
T-39	1
H-2	1
Total	58

Table No. 5
Calendar Year 1990
Maintenance Personnel Error
Forecast
By Mishap Classification

Flight Mishaps	Class A - 4 Class B - 1 Class C - 14
Flight Related Mishaps	- 4
Ground Mishaps	- 35
Total Mishaps	- 58

Table No. 6
Calendar Year 1990
Maintenance Personnel Error
Forecast
By Problem Area

Supervisory Maintenance	50
Squadron Level	47
Depot Level	5
Airframes/Structures	17
Power Plants	13
Preflight/Postflight	9
Avionics/Electrical/Inst	8
Ordnance/Weapons	5

 # Note (Table No. 6): The counts of failures given do not necessarily refer to separate mishaps since one mishap may have several problems.

The 1988 forecast for CY1989 was 61 Class A, B and C maintenance personnel error flight/flight related and ground miashaps. So far (through September 1989), there have been 41 such mishaps. Special congratulations are in order for the EA-6B community for the way it has operated in 1989 (January through September) – 0 mishaps, when 4 had been forecast.

BRAVO ZULU

Cleatus Ducksworth

Discovery of a Failing Rod End Bearing

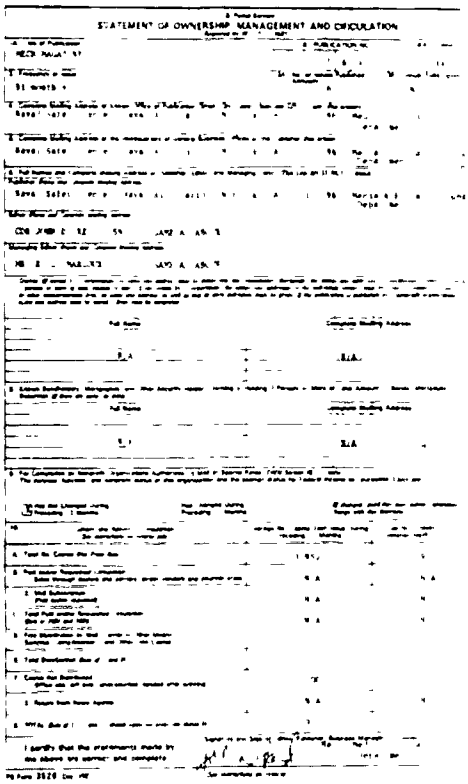
AMH3 Charlie Richardson, a plane captain and LSE in HS-17, was conducting a daily inspection on an SH-3H. When he tried to rotate the rod end of a flight control input rod, he found the bearing extremely tight and hard to move. This input rod is located in the upper, aft, tail pylon and controls the pitch of the rotary rudder. Trouble-shooting why this bearing was binding, he rotated the rod and heard the bearing make a grinding noise.

Normal procedure only calls for a visual inspection of the upper pylon structure for cracks, corrosion and loose rivets. Rotating the input rods is an added check that Petty Officer Richardson has adopted in order to get a clearer understanding of bearing condition. Others had made several visual inspections of this area before his check without finding defects.

Maintenance personnel confirmed that the bearing was near failure. If this bearing seizes in flight and locks the pitch of the tail-rotor system, it could result in an aircraft mishap and loss of life.

AMH3 Richardson's detection of this bearing failure has implications for the entire rotary wing community—improve your inspection criteria and find failing bearings before they can cause a catastrophe.

Well Done, AMH3 Richardson!


STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION

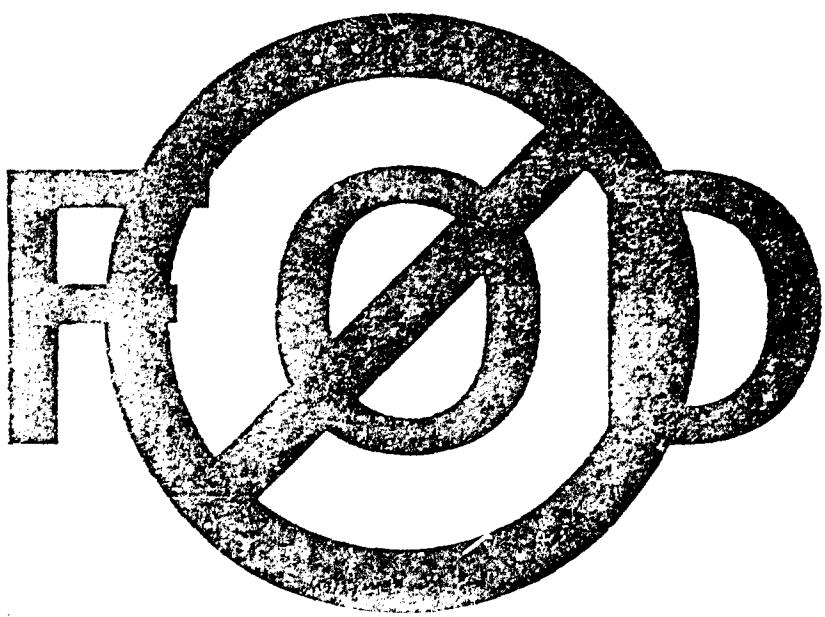
★U.S. GOVERNMENT PRINTING OFFICE: 1990—727-007/20001

Safety is for Everyone Who Cares

I wear my goggles, not just for me, but for everyone who cares.
So they won't look into my face and see scars, and empty stares.
I wear all kinds of hearing protection, it hurts and drives me batty.
But my young daughter likes me to hear her say "I love you daddy."
I don my gloves and splash shield, and look like somethin' from Mars.
Few's the time my wife will ask, "Hey sweetie, what're those scars?"
I've followed, and will always follow, checklists to the letter. • I'll continue following them until they come up with somethin' better. • I maintain this demeanor all the time, wherever I may roam. • At work, or play, in traffic, and especially at home. • I strap my daughter in her car seat, she may let out a whine. • Yet in that seat she has a chance, and it suits me just fine. • I check my fire alarm quite often, ensuring that it will work. I've drilled my kids and told them all how much a fire can hurt. • Paranoid is what you think and then you wonder why. • But the thought of losing a loved one tragically, almost makes you want to cry. • I'm very safety conscious, however it's not from fear. I wish to see, for a very long time, the ones that I hold dear.

Poster idea contributed by AE1(AW) Randall F. Baker, VS-37 CESPO.


JUST
SAY
NO
TO


FOOD